PLASTICS

A Periodical Devoted to the Manufacture and Use of Composition Products

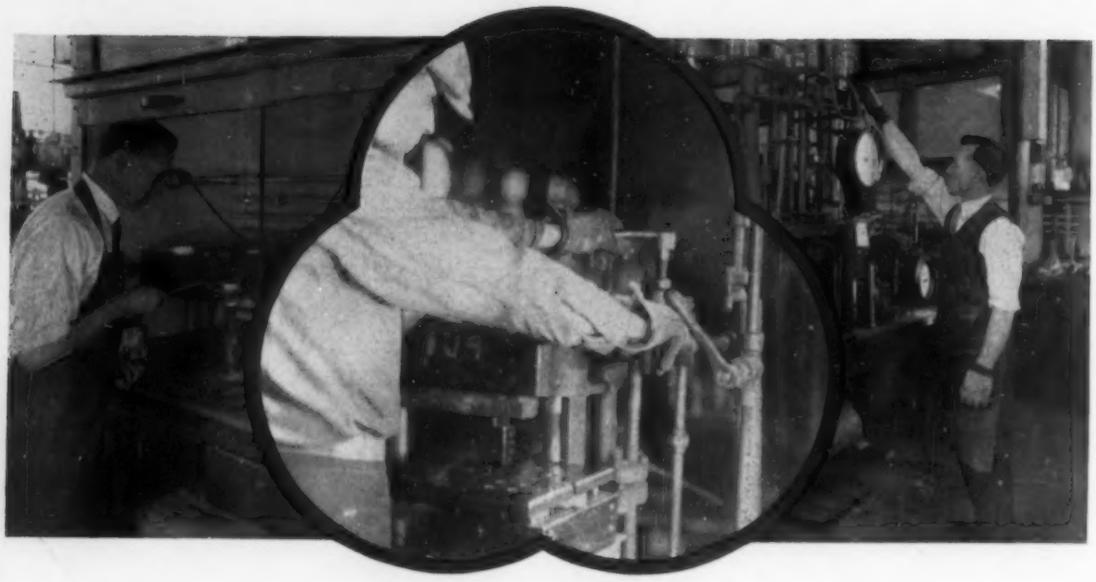
NOV 22 1928

MARCH, 1928

COLOR
KAROLITH will help you to to meet the demand for color in the home.
MOLDING SERVICE
Parts molded in special forms to your specifications, in all colors. Send us your blue-prints, specifications, or samples for estimate of cost.
This new development is a scientific achievement of our research laboratories, and is only available with Karolith.
Karolith is regularly supplied to manufacturers in rods, tubes and shelts, in all colors. Non-inflammable, non-conductive odorless, fadeless, tasteless.
Write us for information, stating your requirements.
KAROLITH CORPORATION
2125-2129-44th Road, Long Island City, N. Y.

Molded Products

See Page 155



Cooperation that spans the period from design to production

PLANS had been completed for reproducing in America an electrical device of European manufacture. Difficulties developed early, for it was discovered that the special form of hard-rubber insulation called for was unobtainable in this country. A suitable material had to be found or the plans abandoned.

A Bakelite engineer was consulted. He found that the part in question was intricate in form, and that the material used in it must meet a severe electrical break-down test. High tension tests were conducted in the Bakelite Laboratories and a Bakelite Material selected which would exceed the requirements. The engineer then enlisted the cooperation of a trade-molder and the problem of designing the complicated mold was solved.

When the part was put into production it was found that, owing to its intricate form and the unusually severe conditions of operation, cracks developed. This problem was taken to the Bakelite Laboratories and a special form of Bakelite Molded was provided, one which combined great toughness and strength with the required electrical properties. Through this Bakelite cooperation the device is now in successful production.

It is because of the years of experience that is concentrated in the Bakelite Laboratories, of the training and resourcefulness of our engineers, and the wide variety of Bakelite Molding Materials which we have developed, that the solution of unusual and difficult molding problems by Bakelite engineers is a matter of daily occurrence. We welcome inquiries from trade-molders and manufacturers. *Write for Booklet No. 51, "Bakelite Molded".*

BAKELITE CORPORATION

247 Park Ave., New York, N. Y. Chicago Office, 635 W. 22nd St.

BAKELITE CORPORATION OF CANADA, LTD., 163 Dufferin St., Toronto, Can.

BAKELITE

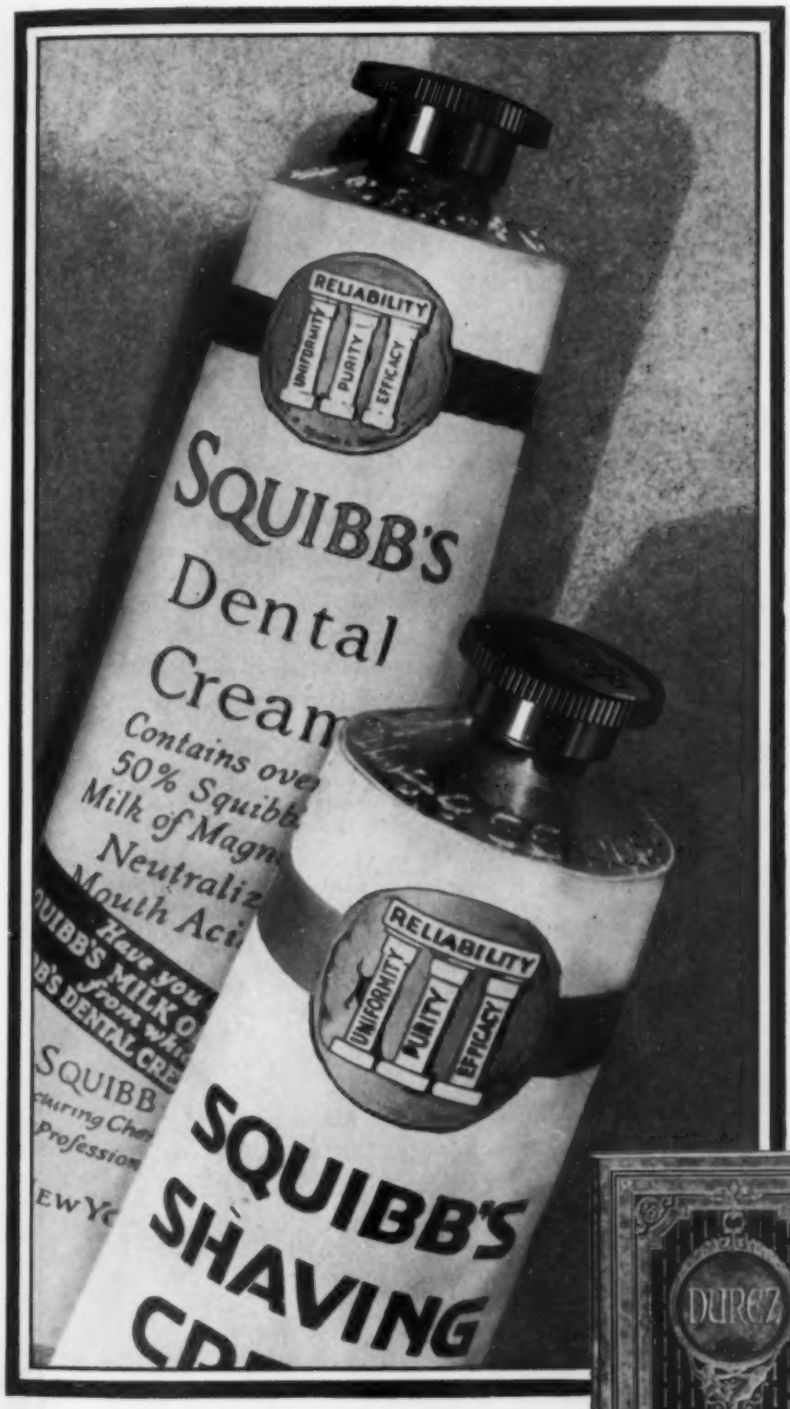
REGISTERED U. S. PAT. OFF.

THE MATERIAL OF A THOUSAND USES

"The registered Trade Mark and Symbol shown above may be used only on products made from materials manufactured by Bakelite Corporation. Under the capital "B" in the numerical sign for infinity, or unlimited quantity, it symbolizes the infinite number of present and future uses of Bakelite Corporation's products."

PLASTICS, Vol. IV. No. 3, March, 1928. Publication office 49 E. Washington Avenue, Washington, N. J. Executive office, 471 Fourth Ave., New York City, N. Y., by The Hoffman Publications, Inc., Sylvan Hoffman, President. Subscription price, Domestic $3.00 per year, 35c per copy. Foreign and Canada, $4.00 per year. Entered as second-class mail at the Post Office at Washington, N. J., under the act of March, 1879, and copyright, 1927, by The Hoffman Publications, Inc.

One or a million without variation



E. R. SQUIBB & SONS, celebrated manufacturing chemists, are now using Durez caps on their tooth paste and shaving cream tubes. This great concern finds that Durez adds a note of distinction which is entirely in keeping with the Squibb methods of merchandising.

These caps cannot discolor the cream or paste. They fit absolutely air-tight—eliminating cork inserts. And—they are remarkably economical to manufacture.

Durez may be regarded as an outstanding achievement in the molding industry. It fuses and hardens with marvelous rapidity. Once molded, the part is complete. No costly tooling or burnishing. Best of all, the millionth part will be an exact duplicate of the first.

Durez has a high physical and a high dielectric strength. It resists heat, oil and dampness. With this remarkable plastic, *you* can give *your* products better wearing properties, better insulating properties and an all-round distinction which brings quicker consumer acceptance.

If you are faced by a peculiar molding problem, let us aid you in its solution. Our engineers and laboratories are at your service at all times. For complete information write to General Plastics, Incorporated, 21 Walck Road, North Tonawanda, New York. Also New York City, Hartford, Chicago, San Francisco.

DUREZ

Send for this interesting booklet

Our new booklet, "Do it with Durez," tells the complete story of this wonderful plastic. It shows how Durez is economically adapted to meet the most exacting needs. Profusely illustrated in full colors. Write for a copy today.

Aladdinite

1St

in United States

Aladdinite was the first casein plastic to be manufactured in this country.

In Aladdinite you have a strong, durable, workable material that is INEXPENSIVE, NON-INFLAMMABLE and SANITARY.

It machines easily because it is made from the finest quality of imported casein.

The uses of Aladdinite are unlimited, particularly being applied in the button industry, in radio, for novelties, fountain pens, pencils, cigarette holders, beads and combs.

Aladdinite is superior to hard rubber, wood, ivory, or any expensive and dangerous materials for both economic and safety reasons.

Aladdinite comes in sheets and rods—in all colors, either solid or mottled, and such pretty effects as buffalo horn and tortoise shell. It takes a beautiful finish readily.

If you are interested in component parts made from Aladdinite, we shall gladly refer you to reputable manufacturers fabricating it.

Insist on Aladdinite, the original American material.

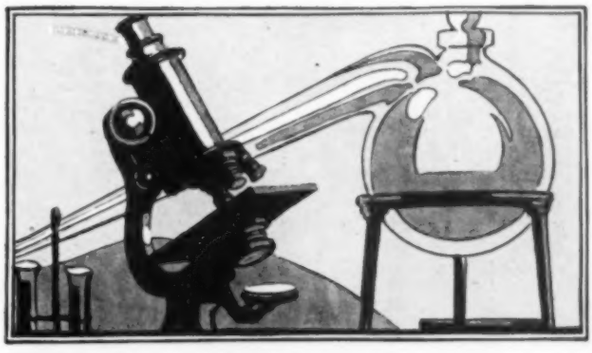
Aladdinite Co., Inc.

ORANGE, N. J.

Established 1919

PLANTS AT ARLINGTON, NEW JERSEY AND LEOMINSTER, MASS

Du Pont facilities for chemical research make possible Pyralin's high uniform quality



YOU must have absolute confidence in the quality of the products you buy. You must be sure that every order and every part of every order will have the same quality as the finest samples of the product.

Every piece of Pyralin that you buy, every order, every part of every order, will have the same uniform quality which places Pyralin in a class by itself.

The uniformity of every sheet of Pyralin is the direct result of du Pont facilities for chemical control and research. Through every step, from raw product up—through every intermediate process of manufacture, this exacting chemical control is exercised by du Pont research engineers.

Du Pont industrial research engineers, our chemical laboratories, are at your disposal. Add them to your own facilities for research and investigation. We shall be happy to give you our full cooperation, without, of course, placing your organization under any obligation.

The ever-changing needs of the plastics manufacturer are met unfailingly by Du Pont Pyralin. Exact production methods and tested seasoning produce Pyralin Sheeting of thorough reliability.

DU PONT

REG. U. S. PAT. OFF.

PYRALIN

Sheets Rods Tubes

DU PONT VISCOLOID COMPANY, INC., 330 FIFTH AVENUE, NEW YORK CITY

BURROUGHS BURROUGHS BURROUGHS

BURROUGHS

A NAME of authority in methods and equipment for working Thermo Plastic Materials.

We still build Molding Presses of the same construction as those designed by Bramah (A. D. 1814), Because

1st—Others still build them

2nd—A few engineers like antiques

3rd—We get a little of this business

BUT

We also build Molding Presses of present day design, because

1st—They are adapted to your requirements

2nd—Most engineers are very progressive

3rd—We get most of this business

The Burroughs Company

Established 1869

248 NORTH TENTH STREET NEWARK, N. J.

BUILDERS OF HYDRAULIC MACHINERY FOR ALL PURPOSES

BURROUGHS BURROUGHS BURROUGHS

PLASTICS
& MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 4 MARCH, 1928 No. 3

Contents

Progress in the Cellulose Ester Art, By Carl Marx 129
New methods of producing cellulose acetate, precipitation of films by water, and effect of ultraviolet light on cellulose acetate solution described.

The Effect of Mechanical Working on the Plastic Properties of Materials, By O. Manfred and J. Obrist 131
An interesting and instructive dissertation on the plastification of various organic substances in the light of physical chemistry.

New Mechanical Molding Press 133

Metal and Pyroxylin Give Striking Effect 134
A novel form of mottled plastic sheets produced by a special form of interleaving of metal foil and plastic sheets, followed by pressing and cutting.

Direct-Molding Rubber Plastics 135
Phenol, trichloracetic acid and rubber condensed into a thermoplastic body.

Some Odds and Ends in Molding 138
Hardening under gas pressure; molding spools; wood-veneered radio panels; and shock-absorbers on connecting plugs furnish the subject matter of invention.

Cellulose Xanthacetic Acid—A New Type of Cellulose Compound Soluble in Water 140
Leon Lilienfeld, whose classical work on cellulose ethers has made him widely known, contributes a new useful member to the family of cellulose compounds.

Technical Abstracts and Patent Review 142

MOLDED PRODUCTS—See Page 155

New Fabric Base Material 155
High mechanical strength and shock resistance are outstanding features of this material.

Molding Possibilities of Cellulose Acetate, By Carl Marx 156
Short resume of this industry from its inception down to the present.

How the Molder May Safeguard the User 157
Description of tests made by one molder in an effort to keep their product up to standard.

New Camera All Molded, By J. A. Maguire 158
Color, durability and light weight are factors and influenced this manufacturer to use phenol resinoid materials for most of his parts.

The Heart of Every Motor Car 159
New patent covering the molding of a complete battery box.

Plastics and Glass in Happy Union 160
Latest development in safety glass field.

Molded Boats and Canoes 162
A rather bold idea advanced by an inventor which is not beyond the realm of possibilities.

More Tube-Bases and Sockets 164
Resume of some of the recent patents in the radio field.

Carl Marx, B. Ch., Editor
J. A. Maguire, Editor Molded Products
William Gruen, E. E., A. M., Associate Editor V. C. Rockhill, Consulting Editor
A. C. Blackall, British Correspondent Heinrich Prehn, German Correspondent
Publication Office: Washington, N. J.
Offices: 471 4th Ave., New York. Telephones: Ashland 6280, 6281
SYLVAN HOFFMAN, Publisher ALAN COHEN, Adv. Director
E. D. Sheriffs, Chicago Representative
80 E. Jackson Blvd.
Subscription Price—U. S. $3.00, Foreign $4.00 Per Year Issued Monthly—35 cents a copy

Copyright, 1928

Erinoid

The Dependable Casein Solid

All colors, in sheets, rods and tubes

ERINOID COMPANY OF AMERICA

15 PARK ROW, NEW YORK, N. Y.

Factory: Bainbridge, N. Y.

PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 4 MARCH, 1928 No. 3

Progress in the Cellulose Ester Art

New methods of producing cellulose acetate; precipitation of films by water, and effect of ultra-violet light on cellulose acetate solutions described

By Carl Marx

Although the utilization of cellulose acetate for producing plastics is by no means recent, more real progress toward the practical utilization of this material has been made in the past ten years than in the forty that preceded it.

WITHIN the short space of two months, no less than six United States patents have issued on the subject of cellulose acetate. They range from new methods for the production of the ester itself, production molded products of peculiar effect, the formation of artificial silk and of low viscosity lacquers and solutions. The art of mak-cellulose acetate is so closely associated with the production of various types of plastics that at least some of the patents falling naturally into the Rayon field must be considered together with those describing plastics.

Chromium Salts as Catalysts

Two of the patents are by the same inventor, and relate to the preparation of cellulose acetate from cellulose by the use of condensing agents such as sulfuric acid together with chromium compound as a catalyst. Leonard Angelo Levy, U. S. P. 1,655,870, Jan. 10, 1928, says that a good type of acetone-soluble cellulose acetate can be prepared by mixing 5 lbs. of acetic acid with 5 lbs. of acetic anhydride, then adding 0.2 lbs. of sulfuric acid, keeping the temperature below 15°C. 2.5 grams of chromium acetate are then added to serve as a catalyst and thereupon 2.5 lbs. of cellulose, preferably in the form of a pure cotton paper, are introduced.

The acetylation is allowed to proceed at 15°C. until a transparent viscous solution entirely free from fibers is obtained. The temperature is then raised to 30°C. and samples are withdrawn from time to time until the product is found to be entirely soluble in acetone. The entire operation requires about 18 hours.

Without Condensing Agents

In his second patent, 1,652,024, Dec. 6, 1927, which is assigned to Apex (British) Artificial Silk Ltd., he describes a method of acetating at the boiling point without the use of a condensing agent such as sulfuric acid, apparently relying on the catalytic effect of a chromium salt to accelerate the acetylation. In the example given in this patent—5 ozs. chromium acetate are dissolved in 30 lbs. acetic acid contained in a suitable vessel fitted with reflux condenser and agitator; 10 lbs. acetic anhydride are then added and finally 3 lbs. of cellulose, preferably in the form of air dried tissue paper prepared from pure cotton; the mixture is then heated to boiling point until the cellulose has passed into solution, the mass being preferably slowly agitated during the whole period. After this the product may be precipitated forthwith in the usual manner, when it will be found to be soluble in chloroform; or it may be subjected to any of the well known processes for modifying its solubility.

Use of Zinc Chloride

Still another method of producing cellulose acetate is that described by Herbert John Mallabar, of Watford, England, in his U. S. P. 1,652,573; Dec. 13, 1927.

The preferred process according to the present invention consists in treating cellulose in the cold with excess of acetic acid containing a small proportion of sulphuric acid in the cold, then adding a solution in acetic acid of sufficient alkali

acetate to convert the sulphuric acid to alkali sulphate, then acetylating with acetic anhydride at 30°-40° C. in presence of a limited quantity of zinc chloride and finally treating the solution so formed with water at about 100°C. until a test sample yields a cellulose acetate soluble in acetone. The cellulose acetate may be precipitated before the addition of water and separately treated to obtain solubility in acetone or other desired solvent. An important feature of the process is the acetylation at a moderate temperature using a limited quantity of zinc chloride, e. g. 15 to 25 parts per 100 parts of cellulose in presence of about 850 to 1000 parts of acetic acid.

Action of Sulfuric Acid

When acetylation takes place in the presence of strong acid (for example sulfuric acid) there is a fixation of acid in the cellulose molecule, and it is difficult to completely remove this even if the acid is neutralized with sodium acetate after the acetylation has been performed. As a result, with most of the commercial acetates at present known, a charring takes place when they are heated.

This is not the case when zinc chloride is used as the catalyst. If however, this body is used on normal celluloses, quantities of about 50% are required for satisfactory reaction, and prolonged treatment at temperatures of about 50°C. or higher.

In the present process, the preliminary treatment with the sulfuric acid does not result in fixation of the acid on the cellulose as this takes place only during the process of acetylation, that is, in the presence of acetic anhydride. Therefore neutralization with sodium exerts a novel effect when performed at this stage of the process.

The treatment renders it possible to work with smaller quantities of zinc chloride, say 20 to 25% and at a lower temperature, say 35°C.

Sulfuric acid not having entered into combination with the cellulose, there is obtained a stronger acetate which contains no fixed residues and which will not therefore char when heated, and is more stable under ordinary conditions.

Synthetic acetic acid, at a reasonable price, will enable the non-flammable cellulose esters to compete in price with pyroxylin.

It is merely a question of time.

Cellulose Acetate and Pyroxylin Films

The next patent to be considered is controlled by the Du-Pont-Pathe Film Manufacturing Corporation of Wilmington, Del., and is the invention of Alfred Landucci, of Paris. As described in U. S. P. 1,658,725; Feb. 7, 1928, the essential feature of the invention lies in the precipitation of cellulose esters, either the acetate or the nitrate, from solutions in suitable solvents, by allowing the solutions to issue from suitably formed orifices into very cold water. The products obtained are not transparent, but this difficulty is overcome by afterwards subjecting the filaments, films or whatever shape the product is in, to the action of either solvents or solvent vapors, which restore the transparency of the product. Obviously the question of recovery of the solvents is thus much simplified. Two examples are given, one for cellulose acetate and the other for cellulose nitrate. In the first an acetone solution of the acetate is discharged from a small orifice into a bath of water at between 4 to 10°C. The precipitation of the filament is dried and then passed into an atmosphere saturated with acetone vapor wherein it will become remarkably clear and brilliant. The filaments are said to have great strength.

The making of pyroxylin film is described as follows:

A solution of nitro-cellulose in an alcohol-acetone or alcohol-ether solvent is discharged in a continuous flat band upon a well-polished wheel which is partially immersed in a water tank. When in contact with the water (which is suitably renewed) the nitro-cellulose solution will be precipitated. The resulting film is then detached from its support and is passed through a drying chamber in which the water in the film is evaporated. To render the said film transparent, each of its faces may be successively acted upon by a solvent, for instance by drawing it upon guide rollers through suitable tanks containing the solvent. The film is then circulated through a drying chamber in which the solvent is evaporated.

In a modification of the preceding example, the flat band of nitro-cellulose collodion is discharged directly into a water tank, wherein the said band becomes solidified; the resulting film is then seized and drawn forward by rollers disposed at the bottom of the tank.

Action of Ultra-Violet Light on Acetate Solutions

The utilization of cellulose acetate lacquers has been somewhat handicapped by the fact that solutions of this ester are very viscous, and while they readily lend themselves to the production of films on film-wheels, they are too thick for proper application by spraying or brushing. Leonard E. Branchen and Chauncey U. Prachel, assignors to the Eastman Kodak Co., describe a method for the reduction of the viscosity of cellulose acetate by the use of ultraviolet light. According to their patent, 1,658,368; Feb. 7, 1928, ten parts of acetone-soluble cellulose acetate in powdered form such at that made according to the Webb patent (U. S. P. 1,516,225; 1924) are dissolved in 90 parts of formic acid. This solution is subjected to ultraviolet rays, preferably in a

(*Continued on page 147*)

The Effect of Mechanical Working on the Plastic Properties of Materials

An interesting and instructive dessertation on the plastication of various organic substances in the light of physical chemistry.

By O. Manfred and J. Obrist

(A Communication from the Physical Institute of the German Technical High School at Brunn

A few months ago we published an article by the present authors presenting a concise review of the nature of plastification, pointing out particularly the effect of the orientation of the minute micellae in a plastic substance, and the relation of this orienttation to the elasticity, breaking strength and other physical characteristics of a given material.

The authors have made a very extended scientific study of this problem, and have published their results in a German scientific periodical "Kolloid-Zeitschrift" during the past year. (1927, 41, No. 4).

As our readers have shown considerable interest in this fundamental problem of plastics, we will begin, with the present issue, on abstract of such portions of the articles published in the Kolloid Zeitschrift as deal directly with the organic plastic materials. The original article deals with every type of plastics, and is replete with foot notes and references, which, however, are beyond the scope of our own publication, and refer to periodicals that are, unfortunately, only available in a few of the larger libraries in the United States.

Photostatic copies of the original articles may be obtained through our offices.

THE effect of mechanical working upon the elasticity and transverse breaking strength of various plastic materials has already been pointed out in a previous article by the authors. (see Plastics, 1927, 3, p. 591). The optical behavior of some of the modern casein solids has also been studied, and the modulus of elasticity of certain types of these materials has been given, and the relation between methods of manufacture and the results obtained has been discussed.

That the mechanical treatment of matter profoundly influences its physical properties has been known for a long time, and in the case of metals has been studied carefully and scientifically. It has, for example, been noticed that iron will become magnetic when hammered. The remarkable changes occurring when metals are continuously deformed, as for example in the manufacture of wire, when the metal is drawn through dies, has been made the subject of experimentation and research. The effect of heat upon metals thus altered, and their return to the original condition (as in annealing) is a further example of the changes occurring in matter by reason of mechanical stresses and strains.

Effect on Inorganic Materials

These effects, however, apply with equal force to the non-metallic materials, and have been particularly noticeable in plastic materials, as for example in rubber. A study of these effects has been made by B. Weigand and A. Brändle, and reported in Industrial and Engineering Chemistry, March, 1923, p. 259. Within the past three years an excellent resume of the effect of mechanical working on rubber has been published in the Dutch language by W. de Visser in the form of a thesis at Delft University (1925). A review of this appeared in the Gummi-Zeitung Vol. 40, pp. 457 and 511.

With reference to the organic plastic materials other than rubber and data on the mechanical effects of plastification, but little information is available, and the general results have already been described in the previous article above referred to (Plastics, 1927). The authors also discuss, at this point, the plastic properties of certain clays and kaolins, and other inorganic materials.

The Optical Structure of Plastic Materials

O. Wiener, in 1904, as the result of theoretical investigations, proved that any substance that was intrinsically lamellar in structure, would, in sufficiently thin layers, exhibit the phenomenon of double refraction (lamellar double refraction). Braun and Ambronn later showed that there is a somewhat related type of double refraction caused by the presence of very minute rod-like members in a plastic material, these rods being dispersed in an otherwise clear material. The effect is only then noticeable when the rods lie co-axially, and are relatively short as compared to the wave-length of light. Based on the fundamental work of these investigators,

a large number of other researches were undertaken and it was found that these conditions were also true of rubber, celloidine, celluloid, cellulose acetate, casein solids and also the artificial resins.

Somewhat analogous results can be seen, under polarized light, in flowing colloidal dispersions or "sols". The investigations have extended to such widely diversified materials as artificial silk, especially such as is made from cuprammonium cellulose solutions.

The various effects of plastification on the properties of plastics has already been discussed. For the present, therefore, the commercial technical methods employed for the production of materials exhibiting the properties of plastic flow are of immediate interest. The authors here go into considerable interesting detail.

Commercial Plasticizing Methods

The production of a plastic material from a substance such as casein, which is by no means inherently plastic, but whose plasticity is in good part produced by the mechanical operations that the product undergoes in the manufacturing processes, provides an excellent opportunity for a study of the effect of these operations. For this reason, casein plastics are taken as an example. Furthermore, a greater amount of numerical data are available in this case, so that a comparative study can be made.

In Making Casein Solids

All of the methods of manufacturing casein solids start out with finely ground or pulverized casein that is mixed with from 15 to 45% of water. Although the casein is not directly soluble in the water, an immediate swelling of the same (dispergation) sets in. That the mechanical working of the casein yields better results has been empirically recognized and described in a German patent, D. R. P. 391352, in which it is stated that "a better type of casein solid can be produced by mechanically working and kneading the curd from which the casein itself is to be made."

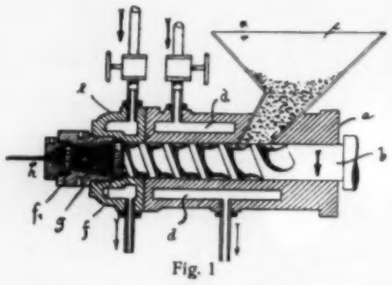


Fig. 1

The further changes that take place in the making of casein solids, and the actually plastification of the same, which usually occurs at around 80 to 85°C., and under very considerable pressures, may conveniently be devided into two general groups:

1. Methods based entirely on mechanical plastification,
2. Methods combining mechanical as well as chemical effects.

The first group can then be further subdivided into such methods as employ a spiral screw extruding machine, while the second method in some instances depends entirely upon mere rolling or even plain static pressure, as in molding operations.

Extrusion

The extrusion machines employed in the production of casein solids are modelled after those employed in the rubber industry for the manufacture of rubber tubing or the like. They closely resemble the ordinary household meat-chopper, except that they are much stronger and invariable are provided with means for heating and chilling. A typical press of this kind is illustrated in Fig. 1. This consists of a thick-walled cylinder *a* on the interior of which a spiral screw *b* operates. The casein solid entering through the funnel *c* is picked up by the screw *b* and propelled into the plasticizing space *g*. It is at that point where the mechanical plastification takes place.

As any preliminary heating and packing together of the casein is to be avoided in the cylinder itself, the latter is provided with a cooling-jacket *d*. The gradual compression of the casein particles, and their mutual interference and friction causes a very severe disaggregation of the particles, as the process is carried out under exceedingly high pressure. When the pressure and mechanical work on the particles has reached its maximum, namely when the particles reach the plasticizing space *g*, the material is heated by the passing steam or hot water through the jacket *e*, the temperature here being maintained between 80 and 85° C. Under the influence of the heat, the particles become welded together (plasticized) and form a more or less homogeneous mass.

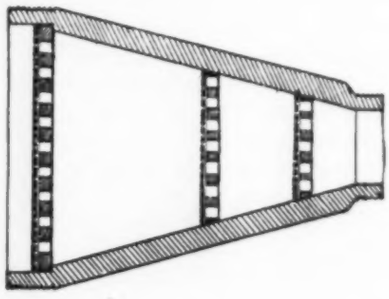


Fig. 2

In order further to insure the mastication and plastification of the material, it is forced to flow through two sieve-like screens *f* and *f!* The first screen serves not only to increase the pressure on the material, but assists materially in the disaggregation of the casein. The second screen *f'* functions as a reaggregating device which serves to allign the particles, while a still further aggregation of the particles in a direction longitudinal to the disarged casein mass takes place when the same finally passes out of the orifice *h*.

Much thought and experimentation has been bestowed upon the various screens, sieves and other resistances employed as "plastifying organs" in these

extruding machines, and a good part of the success of the process lies in the proper choice of these, and the speed etc., of operation.

The Erinoid Co., for example, has patented a number of these devices, and, in accordance with their British Patent 107,-769, 1917, uses first a normal sieve followed a short distance later by a second sieve having much smaller openings. Fig. 2 illustrates the arrangement.

Use of Cones

Another proposal, which, however, is somewhat objectionable by reason of the tremendous pressures required, takes the form of a gradually diminishing cone provided with lateral openings as seen in Fig. 3. The large amount of "dead-end" space in this type however, makes it rather uneconomical, and much power is wasted in pushing the material through such a type of plastifier.

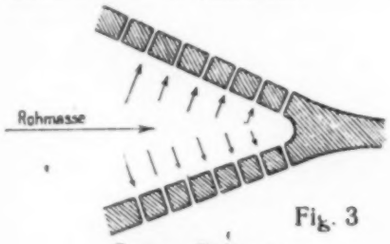


Fig. 3

Loose Spheres

A recent suggestion, which appears to have considerable merit, proposes the use of a number of freely movable round objects between two sieves, so that the casein is required to pass through a sieve, and then to become mixed with the moving spheres, whereupon it is screened from the spheres by passing through the second sieve. The idea is illustrated in Fig. 4. It is pointed out, however, that here too there is a lot of dead space.

The best type of mechanical device for effecting a complete dispergation and plastification of materials of the general nature of casein solids is that illustrated in Fig. 5. In this type, the material is forced to pass over a number of knife-like edges which are arranged in a concical shell. The casein mass constantly impinges upon a cutting surface, but by virtue of their shape the material is constantly turned back upon itself so that its path through the extrusion machine is appreciably longer. In this form of dispergator, the dead-space is at a minimum.

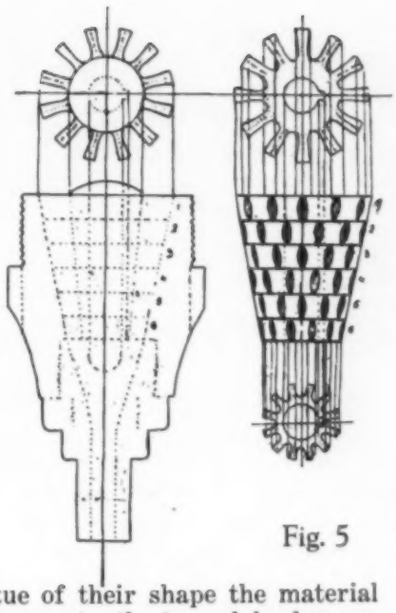
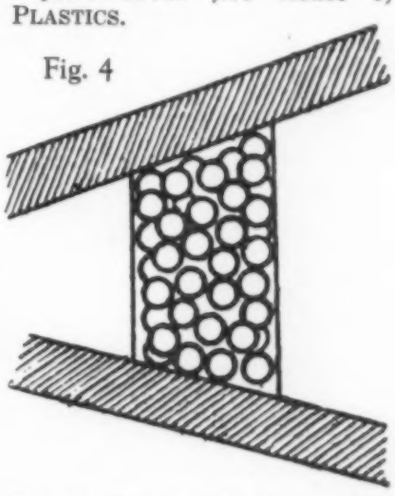


Fig. 5

For the sake of completeness, it might be mentioned that there are also some types of dispergators that depend upon friction discs and a multiplication of the spiral driving screws, but neither of these presents any real marked advantages.

The mechanical plastifying effects of other means of dispergation will be discussed in the next article. It is contemplated that a reproduction of the entire series of articles will require about five issues of PLASTICS.

Fig. 4



Showing idea of using loose spherical bodies through which the material is forced.

New Mechanical Molding Press

THERE has recently been placed on the market a new type of mechanical spring press for the molding of synthetic compounds. Its nucleus is the old and well known rack and pinion arbor press power driven. It is equipped with mechanical means to control the stroke, rate of travel, and the amount of pressure applied to the mould.

It is adjustable for any stroke up to and including 12" with the option of having a longer stroke if desired. The changing of the stroke is made instantly. The working height of the platens may be regulated to suit the operator while the upper platen has an adjustment of 10" permitting various height moulds to be used. The pressure stroke of the ram has a fast approach to the point where the material begins to receive pressure and without any attention from the operator the speed is changed to a slow approach while the material is being subjected to full pressure. If a dwell is desired before exerting full pressure, a partial pressure may be applied by the operater through the movement of a small lever. The ram may be stopped or reversed at any point.

On the opening of the stroke a positive mechanical ejector comes into operation automatically and ejects the pieces from the die. If hand moulds are used this mechanism may be made inoperative. The ram comes to rest at the bottom of its stroke leaving the ejector pins in a position so that the operator may easily remove the moulded pieces and clean the pins. A hand release is provided so that the ejector pins are returned to normal position.

This press developed by the Terkelsen Machine Co., is a complete moulding unit, individually motor driven with a self contained "accumulator" in the form of four heavy double coil springs which enables this unit to give the required follow-up pressure.

Metal and Pyroxylin Give Striking Effects

A novel form of mottled plastic sheets produced by a special form of interleaving of metal foil and plastic sheets, followed by pressing and cutting

Fig. 1

Mere solid colors, especially in the pyroxylin and similar cellulose ester plastics, are not sufficient to interest the ultimate consumer. Manufacturers have been vying with each other in the production of startling and attractive effects. Pearl effects fairly revolutionized the toilet-goods trade, and dominated the market for a few years. Metallic effects are now in vogue, and one method of obtaining these is described in the present story.

The article is based on U. S. P. 1,657,172; Jan. 24, 1928, granted to Karl W. Monroe, of North Arlington, N. J., and assigned to the Du Pont Viscoloid Co.

INTERLEAVING metallic foil with pyroxylin plastic sheets, and incorporation of metallic powders are both relied on in a recently patented process for the production of very interesting mottled effects.

The product of such method is a compound structural sheet which simulates mother of pearl and other variegated shell structures; and, more specifically, it is a composite sheet of cellulose ester plastic and foil which is presented to the surface of the sheet in substantially edgewise relation to give an edge grain effect in the composite article.

Metallic Mottle

As an aid to the understanding of the process, there are shown in the accompanying illustrations somewhat conventionally, the materials at different stages of the procedure, together with elementary showings of apparatus that may be used. In these drawings:—

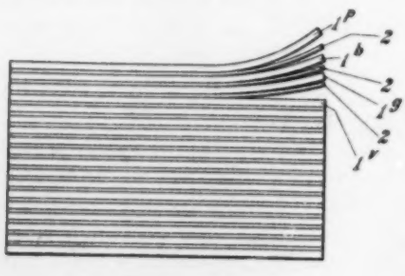


Fig. 2

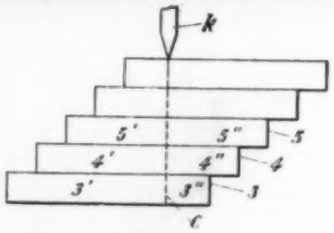


Fig. 3

Figure 1 is a face view of one of the plastic sheets used in making up the stack of plastic and foil sheets Figure 2;

Figure 2 is an elevational view of the stack of plastic and foil sheets;

Figure 3 is an elementary showing of the manner of cutting portions of the stack, Figure 2, to provide units for making the plastic-and-foil block;

Figure 4 is an elementary view indicating the manner of making the cut portions, Figure 3, zig-zag;

Figure 5 is an elementary view showing the zig-zagged cut portions, Fig 4, in the press, section lining of the portions being omitted to avoid confusion;

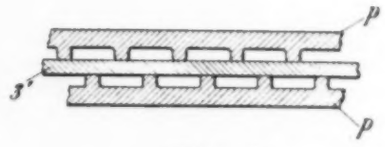


Fig. 4

Figure 6 is a side elevation of the block made in the press, Figure 5, and from which the plastic-and-foil sheets are sheeted;

Figure 7 is a conventional edge view of a sheet from the block, Figure 6, having cover sheets, applied thereto, and

Figure 8 is a face view of the finished sheet.

Use of Foil

In brief, the method comprises welding together in a solid block sheets of cellulose ester plastic inter-leaved with foil, with the material so arranged in the press as to give a block of plastic with foil lying therein as irregular graining; and then sheeting the block across the grain, giving the desired material. These sheets are, desirably, then straightened and polished, and are useable for various ornamental and useful articles, such as buttons and the like. To in-

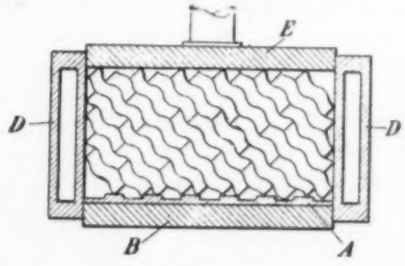


Fig. 5

crease the strength of the sheets they may have attached thereto, on one or both faces, a sheet of transparent plastic.

The making of a variegated sheet of pyroxylin plastic is as follows:—

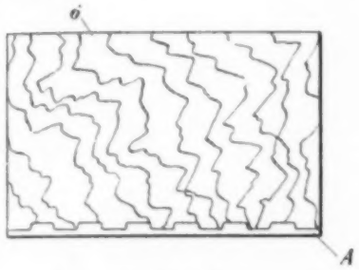


Fig. 6

First: nitrocellulose, camphor and stabilizing materials, previously colloided, for example with denatured alcohol, are subjected to the usual rolling or grinding operations to produce sheets or slabs; and these slabs are formed into a cake and the cake sheeted to give transparent sheets of plastic.

To give the desired color effects pigments, dyestuffs or bronzing materials may be ground or rolled into, or brushed onto the colloid, for example onto sheet stock delivered by the rolls; and if desired the grinding or rolling in and the brushing on may be used in conjunction. At the rolls the excess solvent is worked off, the percentage remaining varying from approximately 8 to 15% and, for present purposes, a relatively high percent, say 12 to 15, being desirable. Desirably, to obtain a number of somewhat differently colored sheets, the colloid to be rolled is divided into several portions, say four, and each given a distinct color, as blue, green, pink or violet.

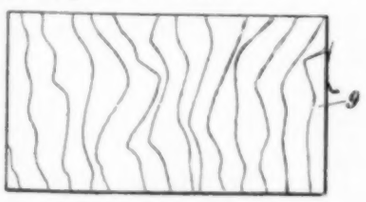


Fig. 8

When the rolling operation of each portion has been practically completed, i. e. to the point where the materials have been thoroughly incorporated, and nearly all excess alcohol evaporated, portions of each of the four portions are combined on the rolls to give four new portions and in the making of these four new portions an excess of one color is used for one portion, and an excess of a different color for a second portion, and so on, giving four mottled portions each with a different color predominating.

The slabs (about ½ inch thick or more) of these mottled portions as drawn from the rolls are now stacked upon one another in a press, and formed into a cake in the usual manner, the press, of the usual type, being jacketed for heating or cooling with hot or cold water and having a ram for applying pressure, and the temperature and pressure being changed at will so as to cause the slabs to coalesce and form a solid cake. In making the cakes, the slabs of one predominating color are made into one cake, the slabs

(*Continued on page 148*)

Fig. 7

Direct molding Rubber Plastics

Phenol, trichloracetic acid and rubber condensed into a thermoplastic body.

WHILE hard rubber as such has not been taken into the general fold of "plastics" as the result of our editorial policy, the newer types of direct molding compositions made from rubber that has been altered by chemical treatment, or has been condensed with phenol properly belongs in the category of thermoplastic materials.

While not much is yet known as to the commercial possibilities of these materials, they nevertheless present a new departure in that no sulfur is required for their vulcanization. They can be used like some of the synthetic resins for the production of molded articles, that cure rapidly into infusible and highly resistant products. Work in this field is being carried on by most of the large rubber companies.

The Process

For example, the B. F. Goodrich Co., on an application of Harry L. Fisher, of Akron, O., have secured patent protection (U. S. P. 1,642,018; Sept. 13, 1927) on a product of rubber and trichloroacetic acid, with or without phenol.

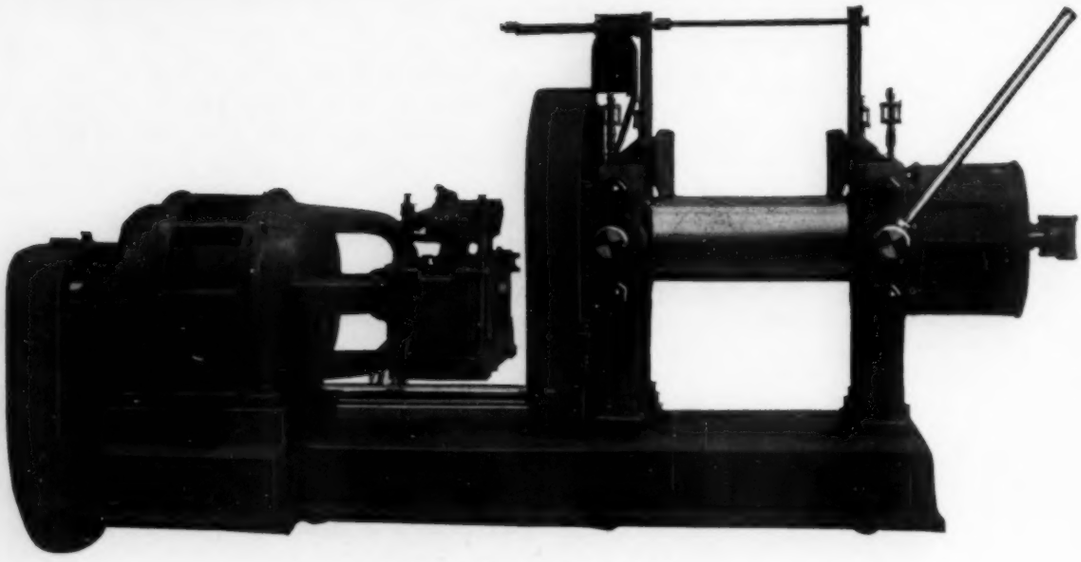
The following examples are given by way of illustration:

Example 1.—Mix up 100 parts by weight of a 5% solution of rubber in benzene 6 parts by weight of trichloracetic acid, thoroughly admixing the ingredients as by stirring. Place the admixture in a suitable receptacle under reflux and heat on a steam bath for an extended period, as for example for two days, in order to ensure the completion of the conversion reaction, then subject the reaction mixture to distillation to drive off the rubber solvent. This leaves a solid residue comprising the conversion product. In preparing or reworking this product for industrial purposes it is desirable to homogenize the mass, as by comminution, or by mastication, or by resolution in an organic solvent, and it may be washed free of residual acid and other water soluble impurities during or after the homogenizing process. This reworking of the product may be carried out without substantially changing the chemical characteristics of the thermoplastic

(*Continued on page 150*)

FARREL

REG U S PAT OFF.



10″x20″ Laboratory Rolls

Equipped with Chilled Iron Rolls, Cut Gears, Gear Guards, End-capped Housings and Common Bedplate, carrying entire unit, controlled by Solenoid Brake. Built in various sizes.

Built by FARREL-BIRMINGHAM COMPANY INC., Ansonia, Conn.

Successor to

Farrel Foundry & Machine Co.
Est. 1848
Ansonia, Conn.

and

Birmingham Iron Foundry
Est. 1836
Derby, Conn.

Special Representative EVARTS G. LOOMIS 810 Broad St., Newark, N. J.

CARVER LABORATORY HYDRAULIC PRESS

FOR

Plastic Moulding and Other Uses

A small Press at a low price. Self contained with hand pump.
Gives any Load up to 20000 lbs. Adjustable, weight 115 lbs.

Glad to send Details.

Manufactured by

FRED S. CARVER

HYDRAULIC ENGINEERING AND EQUIPMENT

90 WEST STREET NEW YORK

Also sold by E. G. LOOMIS CO., 810 Broad St., Newark, N. J.

JOHN J. CAVAGNARO

Engineers and Machinists

HARRISON, N. J.

Established 1881

PRESSES FOR
DEHYDRATING
FILTERING
CAKING
POLISHING
STUFFING
ETC.

DIE PRESSES AND DIES
STEEL STEAM PLATENS
SEMI STEEL CAKE PLATES
SLICING MACHINES
CAVAGNARO-LOOMIS VACUUM MIXERS

Guillotine Cutter
for slicing masses of material

MACHINERY FOR CELLULOID AND PLASTIC MFRS.

Special Representative

810 BROAD ST. **EVARTS G. LOOMIS** **NEWARK, N. J.**

LOOMIS SWING JOINTS

The Guaranteed Solution of Your Flexible Connection Problems

The Joint With Ten Years Successful Service

Order them now

Standard With Many Leading Manufacturers

Send for our Bulletin "L"

EVARTS G. LOOMIS CO.

A Product of EVARTS G. LOOMIS CO. 810 Broad St. Newark, N. J.

Some Odds and Ends in Molding

Hardening under gas pressure, molding spools, wood-veneered radio panels, counter-painted radio dials, and shock-absorbers on connecting plugs furnish the subject matter of invention.

THE use of gradually increasing pressure to assure the proper hardening of viscid liquid phenol condensation products, especially when they are used for covering other molded materials, as for example in making artificial teeth, has been patented to Eberhard Wieland, of Germany. (U. S. P. 1,639,475; Aug. 16, 1927).

The pressure needed is applied in a closed boiler somewhat on the order of the "Bakelizer" only that in this case the pressure is very gradually built up during the hardening and cure of the resin. The temperature is not over from 50° to 70° centigrade, and a special form of temperature and pressure regulator is described.

The process claims a process of molding and hardening resinous plastics which comprises subjecting the reactive resinous material to a preliminary condensation to convert the material into a viscid mass and then subjecting the mass, while under continued pressure, to a gradual increase in temperature, the final temperature being not substantially above 80°C.

Resinoid Spools

William Briggs, assignor to the General Electric Co., in his U. S. P. 1,631,668; June 7, 1927, describes a method of molding a phenol resin spool. The compressing and molding operation is preferably carried out while the material is cold. Rings or flanges made from sheet material are used. While the phenolic resin binder is not softened during the preliminary cold pressing, the convolutions of the fabric are nevertheless sufficiently compressed and interlocked to cause a certain amount of adhesion. A final hot molding operation completes the spool.

Never before in the history of the art of molding and shaping plastic materials has there been as great an activity among inventors as at present.

The patent offices, not only of the United States, but of Europe as well, are literally swamped with new inventions in this fertile field.

Here are but a few.

The process claimed comprises the method of forming a molded article by loosely assembling a plurality of layers of sheet material, compressing them edgewise while cold into a solid mass with approximately the dimensions desired, and then further compressing the mass uniformly in all directions in a heated mold.

Veneered Panels

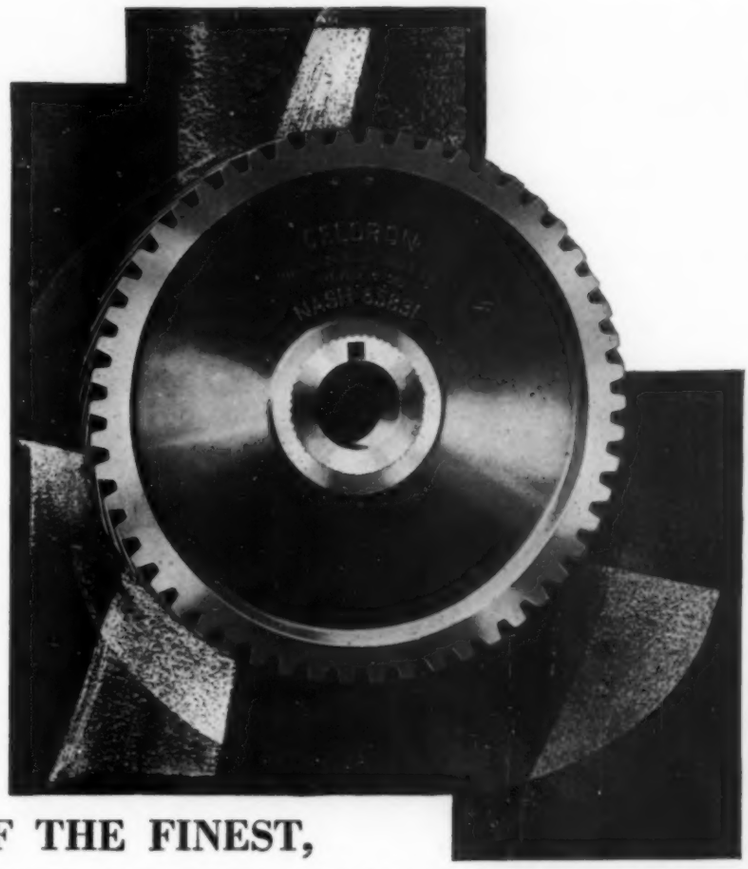
The Westinghouse Electric & Mfg. Co. shows a method of molding a radio panel, having raised portions around a round ended opening in the panel of a radio set, which the drawing identifies as the top of the well-known Radiola III. This panel has a wood veneer surface, although it is molded from a cotton fabric phenol resin material. A slight deliberate warp is introduced into the panel.

The process covers a molded laminated article comprising felted material impregnated with a binder, a layer of wood veneer on one side of the felted material, a thinner layer of wood veneer on the other side of the felted material and a bead molded on the other layer, all of the said layers being consolidated to form a unitary hardened mass. The patent, U. S. P. 1,637,362; Aug. 2, 1927, is the invention of Frank H. Tupper.

Weighted Dial

Frederick W. Renwick, of Camden, N. J., patents a radio dial having a suitable counterweight integral with it to counterbalance the rotor plates of an attached condenser, so as to stabilize the operation of the latter. The weights are independently adjustable to meet varying conditions. The weights are sector shaped and fit into a recess in the rear of the dial, as shown in the illustration. U. S. P. 1,637,051; July 26, 1927.

To prevent the breakage of molded attachment plugs such as are used for making household electrical connections, especially such types as are screwed directly into lamp sockets in lieu of the lamp bases, Edwin C. Ballman, of St. Louis, Mo., places a rubber ring or buffer around the widest part of the plug, so as to act as a shock absorbed when the plug is dropped. An annular recess retains and holds the rubber ring. U. S. P. 1.636,798; July 26, 1927.



ONE OF THE FINEST, MOST WIDELY-KNOWN MOLDING JOBS IN THE WORLD

. . . *has proved the superiority of Celoron*

Celoron Silent Timing Gears, molded from fabric and Celoron Resin *exclusively*, have so demonstrated their superiority that 42 motor manufacturers have adopted them as standard equipment. In this list are such names as Ford, General Motors, Continental, Chrysler, Nash, Marmon, Citroen, Hotchkiss, Renault, Studebaker.

The most amazing tests for strength, wearing qualities, accuracy and permanence ever made upon a molded product, have been made upon these gears. And running in hot oil in the motors, they withstand the most strenuous service.

This is the same improved phenolic resin from which Celoron Molding Powders are made and offered to the molding trade. All we ask is that you try it — at our expense. Let us send you a sample quantity to test out side by side with the molding powders you are now using.

The Celoron Laboratory where Celoron Molding Powders were developed and perfected.

THE CELORON COMPANY, Bridgeport, Pa.
Division of Diamond State Fibre Co. (In Canada: 350 Eastern Ave., Toronto)

CELORON
MOLDING PRODUCTS

MOLDING POWDERS — IMPREGNATED FABRICS AND PAPER FOR MOLDING. Also, Laminated Products and Resins for Electrical and Industrial Purposes — Celoron Silent Gears.

Cellulose Xanthacetic Acid—A New Type of Cellulose Compound Soluble in Water

Leon Lilienfeld, whose classical work on cellulose ethers has made him widely known, contributes a new member to the family of cellulose compounds

THE first commercially valuable cellulose compounds were the cellulose nitrates discovered by Schoenbein and by Boettger; followed by the cellulose acetates of Schuetzenberger. For many years these two compounds held the center of the stage, although the former were very much more widely used, as they were the basis not only of plastics and coating compositions but formed the fundamental basic material without which modern war would have been impossible, namely smokeless powder and guncotton.

Then came Cross and Bevan in England with the celulose xanthogenates which form the basis of the Viscose Rayon industries. More recently the industrial production of cellulose ethers, such as ethyl and methyl cellulose became possible, mostly by reason of the efforts of Leon Lilienfeld. In the United States this work was carried further by the research laboratories of the Eastman Kodak Co.

Other cellulose esters, such as the butyrate, benzoate, palmitate, laurate, etc., are comparatively recent, and have not yet emerged from the embryo stages. The utilization of cellulose as such, in the form of cuprammonium solutions, such as the "Glanzstoff" silk in Germany, forms another chapter in the utilization of the valuable raw material, cellulose.

According to the present article, still other cellulose compounds may become of technical utility, namely the cellulose xanthic acid compounds with halogenated fatty acids. They are the work of Leon Lilienfeld, whose most recent patent we herewith reproduce in full.

We feel certain that our chemical readers will find this full of interest.

Cellulose Compound and Process Making Same

United States Patent 1.642,587; Sept. 13, 1927, filed on July 23, 1924, and on April 4, 1924 in Austria, by Leon Lilienfeld, describes the new cellulose compounds as follows:

SOLUBLE PRODUCT

According to this invention, new technically valuable cellulose compounds are made by acting on a cellulose-xanthic acid or a cellulose-xanthate with a mono-halogen derivative of a fatty acid.

The members of the hitherto unknown class of cellulose derivatives thus obtained may be arranged according to their properties in a number of groups. As an illustrative example, three groups of the new cellulose compounds will be described in respect of their properties of solubility.

To the first of these groups belong bodies which, particularly in the freshly-prepared condition, are soluble in water, usually in warm or hot water. The aqueous solutions leave on evaporation, shining, transparent layers or skins insoluble, or scarcely soluble in water at ordinary temperature.

The solubility in water which is characteristic of the first group is lacking in the second group. The solubility of their members in aqueous solutions of ammonia or of numerous organic bases of the aliphatic and aromatic series, however, is common to both groups. Remarkably weak solutions, of these agents, for example, a solution of ammonia of only 0.01-0.02 per cent strength, or an aniline solution of 0.25-0.50 per cent strength, suffices to dissolve most of the members of the first and second groups. The solutions yield on drying, shining transparent layers or skins, insoluble in water.

A further property of members of the first and second groups is the solubility in dilute solutions of alkali. Some dissolve in caustic soda solution containing a percentage of caustic soda lying in the third decimal place.

ALKALI SOLUBLE

To the third group belong cellulose derivatives which are insoluble or only sparingly soluble in water and in aqueous solutions of ammonia or organic bases, but which dissolve in aqueous solutions of alkalies, to give solutions from which they may be precipitated by suitable precipitating agents, such as acids, salts, acid salts, alcohols, and the like. If such a solution be squirted through a fine orifice or slit into a suitable precipitating bath it solidifies to a thread or skin which after washing and drying is shining and transparent.

The present invention supplies a longfelt want in the chemistry and technology of colloids, inasmuch as it leads to a new emulsoid, whose solutions in water or in aqueous solutions of volatile or liquid solvents yield on drying clear, shining, pliable layers, which become insoluble in water, even during the evaporation or a simple subsequent heating operation, without being rendered turbid or unsightly by separation of crystals of by-products or impurities.

These properties render the new cellulose derivatives which can be obtained according to the invention suitable for numerous spheres of application. In general they find application in all processes wherein water-soluble colloids, such as starch, dextrin, glue (gelatin), albumen, gums, and the like, are used, and the insolubility in water of the technical product produced by drying constitutes a desirable advance. They may also be used for many purposes for which there are used cellulose derivatives which are insoluble in water and which can be rendered insoluble in water by physical or chemical means. The circumstance that the new cellulose derivatives render unnecessary a special decomposition process, washing process and in many cases a second drying process subsequent to the washing (as in finishes or textiles or in textile printing), and finally bleaching, fits them for many purposes in industry for which viscose cannot be applied, or can be applied only temporarily, on account of the extensive

manipulation necessary.

The new cellulose derivatives also constitute valuable intermediate products for the synthetic manufacture of other important cellulose derivatives.

The invention consists in acting on a cellulose-xanthic acid (thionthiolcarbonic acid ester of cellulose) or on a cellulose-xanthate (a salt of thionthiolcarbonic acid ester of cellulose) with a mono-halogen derivative of a fatty acid, or with a salt or derivative thereof.

START WITH VISCOSE

As parent materials for the invention, there come into question all the cellulose xanthic acids or cellulose-xanthates (viscose) which can be made by any known method with any practicable proportions of caustic alkali solution and carbon bisulphide. For the preparation of such viscoses there can be used bleached or unbleached cellulose as such in any form, in which it can be obtained in commerce, or a conversion product of cellullose, such as cellulose hydrate, hydrocellulose or oxycellulose or any cellulose derivative which still contains a free hydroxyl group to permit it to be converted into an ester of thionthiolcarbonic acid.

The cellulose-xanthic acids may be caused to react either in the form of their alkali compounds without alkali in excess (for example, a crude or purified form of viscose which has been neutralized or made acid by addition of a weak acid), or in the form of their alkali compounds with alkali in excess (for instance a crude or purified viscose of alkaline reaction) or in the form of their compounds with other metals, such as zinc.

When using crude viscose, the parent material may be either the product of the reaction of carbon bisulphide on alkali cellulose before dissolution thereof, or a concentrated or dilute solution of viscose which can be made alkaline, neutral, or acid. If it is required to use a purified cellulose-xanthic acid, or a salt thereof for the invention, any known method of purification may be employed. For example there may be mentioned precipitation by salt or by alcohol, with or without previous neutralization or acidification by means of a weak acid, and subsequent washing with a solution of salt, or with dilute alcohol; precipitation by carbonic acid with subsequent washing; treatment with sulphurous acid or with a bisulphite; dialysis and the like.

NO HEAT NEEDED

It is to be understood that, where the context permits, the terms "viscose", "cellulose-xanthic acid" and "cellulose xanthate" used in the description and claims, include the forms of cellulose-xanthic acids and cellulose-xanthates (viscose) named in the two preceding paragraphs, and means both the free acids and salts.

The reaction between the cellulose-xanthic acid or cellulose-xanthate and the monohalogen derivatives of a fatty acid occurs as a rule without extraneous heating. It can, however, if desired, be initiated or hastened by heating.

(*Continued on page 143*)

Capacity .....50 tons
Working Area of Platens .....18½x12½"
Stroke, Standard .....12"
Maximum Adjustment of Upper Platen .....10"
Motor .....3 H. P.
Approximate Weight .....4800 lbs.
Automatic Ejectors

Terkelsen Mechanical Spring Press
Type E-1 Model 50

The Latest Development in Mechanical Presses

This press in fact is the old and well known rack-and-pinion arbor press, power driven, equipped with patentable mechanical means for controlling the length of stroke, rate of travel of the ram, and the amount of pressure applied to the work. This type of press, its simplicity, long life, and freedom from mechanical troubles is acknowledged by all.

It is economical in operation, inexpensive to install, adaptable to deep and shallow moulding, and easy to operate.

A Partial List of Features

1. A mechanically operated ram capable of exerting pressure the entire length of stroke.
2. Ram closes rapidly to point where moulding begins and closes slowly during the actual moulding of the material. This feature automatically controlled.
3. Amount of pressure adjustable and can be changed from a few hundred pounds to capacity in less than five seconds.
4. Stroke instantly adjustable to any length up to 12". Longer stroke may be had if desired.
5. Ram may be topped or reversed at any point of the opening or closing stroke.
6. Ram may be also stopped at any part of the closing stroke for a dwell before exerting final pressure.
7. Positive mechanical ejection. Ejection stroke adjustable.

TERKELSEN MACHINE CO.
330 A STREET, BOSTON, MASS.

British Representative
FRANCIS PAISLEY
76 Maryon Road, London, S. E., 7, England

TECHNICAL ABSTRACTS
AND PATENT REVIEW

Grain-Curd Casein Manufacture; use of bromocresol green as indicator in. Anne G. Benton, Ind. Eng. Chemistry, 1928, **20**, 15.

To produce a grain-curd casein acceptable for technical uses the hydrogen-ion concentration at which the precipitation is carried out must be carefully controlled. Methyl red was recommended as an indicator for this purpose by Clark in 1920.

The writer now suggests the use of bromocresol green as a much superior indicator for this purpose. The advantage of the indicator lies in the stability of the color comparison tubes. It is also claimed that the end point color is more easy to match, although this appears to be a matter of individual skill.

Decomposition of Nitrocellulose; effect of temperature on the rate of. R. W. Ryan and E. A. Lantz, Ind. Eng. Chem. 1928, **20**, 40.

A precision laboratory apparatus for studying the rate of evolution of nitrogen oxides from heated nitrocellulose at various temperatures is described and the results obtained by a series of tests is illustrated by tables and graphs.

It was found that if the rate of evolution of nitrogen oxides, expressed as the logarithm instead of by the actual number, when plotted against the temperature, yields a straight line. The stability of the nitrocellulose samples determines the steepness of the line. It is stated that this method will give valuable results in determining the relative stability of various samples of nitrocellulose.

Phenol from Benzene Halides. Cheaper phenol possible. W. J. Hale and E. C. Britton, Ind. Eng. Chem. 1928, **20**, 114.

In ordinary peace times phenol (carbolic acid) is made as a by-product from coking plants. During the war, and for some time thereafter, synthetic phenol was made from benzene (benzol) by sulfonation and fusion of the sulfonate with sodium hydroxide. Although it has been known for many years that the halogen compounds of benzene, such as chloro-benzene, would yield phenol on hydrolysis, such as by the action of calcium hydroxide, sodium carbonate, borax and ammonium hydroxide, nothing was done commercially until recently when the Organic Research Laboratory of the Dow Chemical Co., at Midland, Mich. attacked the problem.

The hydrolysis of the chlorobenzene was carried out under pressure in steel bombs, using sodium hydroxide. The temperatures vary from 316 to 370°C, with correspondingly high pressures. The yields appear to vary, but with proper adjustment about 90% of the theoretical yield can be obtained.

The process gives promise of enabling the commercial production of phenol at prices never before attained for this important raw material for the phenol resinoid industry.

Constants of Nitrocellulose Solvents. J. Allington Bridgman, Ind. Eng. Chem. 1928, **20**, 184.

In the manufacture of pyroxylin plastics, and especially in the production of pyroxylin lacquers, the solvents employed play a most important role. Very little accurate information on the solvent power, physical and chemical properties of the solvents is available, except after a painstaking and difficult search. The constants of the modern pyroxylin solvents, such as the viscosity of solutions of cellulose nitrate in given solvents, stability of the ester solvents, rates of saponification, solubility of the solvents in water, depression of temperature on evaporation and the like are given for a long list of solvents, among which are: amyl acetate, butanol, butyl acetate, butyl propionate, "Cellosolve", "Cellosolve acetate", ethyl acetate, pentasol, pentacetate, secondary butyl acetate, toluene, and mixtures of the preceding with non-solvents and diluents.

Explosive Properties of Lacquer-Solvent Vapors. E. G. Richardson and C. R. Sutton, Ind. Eng. Chem. 1928, **20**, 187.

As the solvents enumerated are also employed in the pyroxylin plastics art, and in the rejuvenation and softening of old pyroxylin plastics, the explosive properties of the vapors of these solvents are of importance and interest in the plastics field. The article gives tabulated information on the flash point, vapor pressure, volume of air required for maximum explosive effects and explosive range of such solvents as ether, acetone, methanol, ethyl alcohol, ethyl acetate, isopropyl alcohol, butyl alcohol etc. etc.

New synthetic resin. Paratoluenesulfonamide in resinoids. Howard L. Bender, assignor to Bakelite Corp. U. S. P. 1,650,109; Nov. 22, 1927.

Paratoluenesulfonamide reacts with paraform, formaldehyde and similar bodies having a mobile methylene group to form resinous products which form solid solutions with the phenol-metylene resinoids, and exert a plasticizing effect on the same. The claims cover: "phenol-methylene resin characterized by the presence therein of paratoluenesulfonamide.

Wood Substitute. Harold C. Harvey and Hubert L. Becher, assignors to Agasote Millboard Co., Ewing Township, N. J., U. S. P. 1,651,388; Dec. 6, 1927.

Comminuted wood fibre, 100 parts by weight, is mixed with 100 parts of finely comminuted red accaroid gum and 5000 parts of water, and the mixture thoroughly stirred in a beater. The resulting pulp is run into a mold and the majority of the water is removed by pressure. (See United States Letters Patent No. 971,936 dated October 4, 1910 and No. 1,272,566 dated July 16, 1918). The remainder of the water is removed by the application of heat, preferably in a suitably constructed drier. The dried board, which is in a spongy condition, is then subjected to a temperature of 300° F. and to a pressure of 300 pounds to the square inch preferably between platens containing steam filled chambers.

Artificial Wood. Rosa Camps, widow of Quirico Casanovas, Frederico Schwartz and Enrique Gil-Camporro, Barcelona, Spain. U. S. P. 1,656,169; Jan. 17, 1928.

The method of manufacturing a synthetic wood which comprises applying to sheets of vegetable fiber a coat of a watery solution of a complex soap of resins and fatty acids of certain oils saponified with ammonia, leaving these sheets to dry to eliminate the water and ammonia, assembling them in superposed relation and subjecting them to pressure and heat. In carrying out the process, sheets of paper are treated with a varnish or coating comprising a water solution of resins saponified with ammonium hydroxide, and such other binders as casein, albumen etc. may be used. As the sheets dry the ammonia escapes leaving the resin closely intermingled with the fibers of the paper. The paper is then preferably calendered to give it a smooth surface. The stacked sheets are pressed at below 200° C. The product is much like real wood in strength, but will machine very easily. Complex forms may be molded. The electrical insulating properties are said to be good. Translucent products may also be made.

Removing Diphenylamine from Smokeless Powder. Durian C. Butts, assignor to Hercules Powder Co., Wilmington, Del. U. S. P. 1,650,689; Nov. 28, 1927.

In order to utilize smokeless powder for the preparation of laquer, plastics etc., the diphenylamine contained in the same, and which would discolor the products that are to be made from the powder, is extracted by means of boiling **isopropyl alcohol.**

Cellulose Xanthacetic Acid

(*Continued from page 141*)

The final product of the reaction may be isolated from the reaction mixture either in the form of its salt, notably its alkali salt, or as the free acid.

A practicable method in the former case is for example the precipitation by a dehydrating agent, for example alcohol, acetone or the like or washing with an aqueous solution of the dehydrating agent and, if desired, drying; in the latter case, there may be used precipitation by an acid, by an acid salt, or by another agent which will fix the alkali (e. g. an ammonium salt), followed by washing with water and, if necessary, drying.

The cellulose derivatives which can be obtained according to the invention show the reactions characteristic of the xantho-fatty acids. When heated on the water-bath in neutral or alkaline solution they decompose yielding the respective thiohydroxy-paraffin-mono-carboxylic acid, hydrogen sulphide, carbon dioxide and cellulose, or body of the cellulose group which formed the cellulose component of the reaction product. Their solutions in alkali decompose even at room temperature, splitting off the respective thiohydroxy-paraffin-mono-carboxylic acid.

According to their mode of formation, behaviour and reactions therefore, the new cellulose compounds are cellulose-xanthic fatty acids (cellulose thionthiolcarbonic - hydroxy - paraffin-mono-carboxylic acids) and therefore compounds which are derived from fatty acids by substituting a cellulose xanthic residue for a hydrogen atom united to carbon.

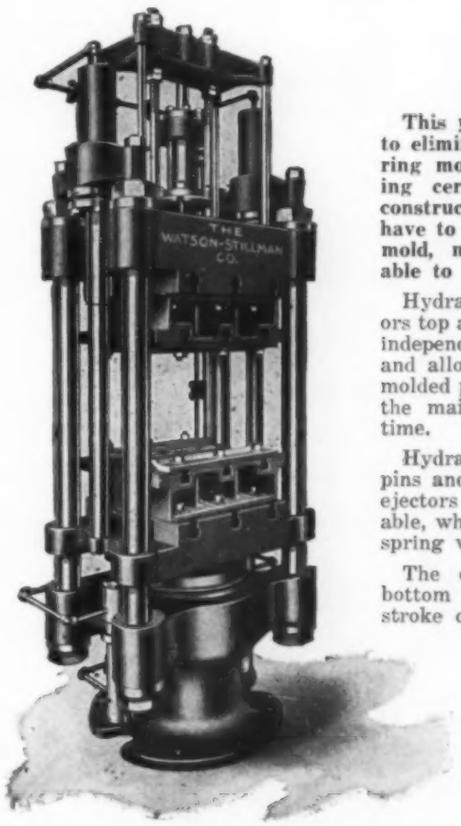
Examples

The following examples illustrate the invention, the parts being by weight:—

Example 1.

(a) 1000 parts of crude viscose (prepared for example by soaking 100 parts of sulphite-cellulose in fleece- or sheet-form with 1000 to 2000 parts of caustic soda solution of 18 per cent strength at 15° to 18° C. allowing the mass to remain for 3-24 hours at room temperature, pressing it until it becomes 300-350 parts, comminuting for instance in a shredder, or the like, if desired maturing for 6-72 hours at room temperature, treating it for several hours with 50-60 parts of carbon bisulphide, and dissolving it in sufficient water to bring the total weight of the solution to 1000 parts), corresponding with 100 parts of cellulose as parent material, are diluted when freshly prepared, or after standing for a short or long period (for example, from 6 hours to three days), with 5000 parts of water and treated with dilute acetic acid (for example, of strength from 5-10 per cent) whilst stirring, until the mixture shows a faintly alkaline or neutral reaction. As soon as the hydrogen sulphide liberated during the neutralization has escaped entirely or in greater part, the viscose, which has become light

Here is a new press for molding Bakelite, Durez, Redmanol, Condensite, Celluloid, etc., in which are incorporated certain features that increase production and decrease mold costs.



This press has been designed to eliminate some of the recurring mold costs by incorporating certain features into its construction, which ordinarily have to be incorporated in each mold, making it more adaptable to all classes of molds.

Hydraulically actuated ejectors top and bottom, are operated independently of the main ram and allow the operator to eject molded pieces at any position of the main ram, thereby saving time.

Hydraulic reseating of ejector pins and hydraulic operation of ejectors is positive and dependable, which is not the case with spring weighted ejectors.

The ejection stroke of the bottom dies is equal to the stroke of the main ram. This long stroke makes it possible to mold deep pieces and eject them without sacrificing any of the press opening.

We build other Presses, for working Plastic materials, in standard sizes from 10 to 1,800 tons capacity and the number of plates and size of openings can be made to suit conditions. The top platens can also be made adjustable to accommodate various heights of dies, etc.

We are prepared to furnish complete hydraulic installations, including pumps, accumulators, valves, fittings, etc.

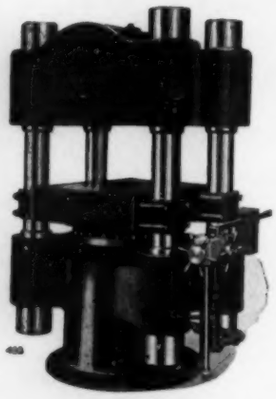
Write for catalogs.

THE WATSON-STILLMAN CO.

12 Carlisle St., NEW YORK CITY

Chicago Cleveland St. Louis
Detroit Richmond Philadelphia

French Hydraulic Machinery



Die Sinking Presses up to 2000 tons Capacity

Hardened Steel Faces. Strong and Rigid Construction.

Write for catalogs.

We build all types of hydraulic presses for the molding industries—hot plate presses with drilled steel or cast hot plates, semi-automatic molding presses, etc.

The French Oil Mill Machinery Company
Piqua, Ohio

New York **Cleveland** **Chicago**

Essential Books

Plastics and Molded Electrical Insulation.

Emile Hemming. 313 pages. Illustrated. $6.00.

Very special care has been taken in the preparation of the chapter on molded insulation. Contains hundreds of references to plastic and composition products and their utilization in industry.

* *

Casein and Its Industrial Applications.

Edwin Sutermeister. 296 pp. Price $5.00. Illustrated. 1927.

Eleven authorities, many of them specialists in this field, have contributed to this volume. "Casein Plastics" is from the pen of Dr. Geo. H. Brother.

* *

The Chemistry of the Natural and Synthetic Resins.

T. Hedley Barry, Alan A. Drummond and R. S. Morrell. 196 pp. Price $5.50. 1926.

The work of three English chemists, who are recognized authorities on this subject, one of vital interest to the Plastics Industries.

Celluloid.

Its raw material, manufacture, properties and uses.

Dr. Fr. Bockmann. 188 pages. 69 illustrations. $3.50.

In this book, the raw product, cellulose and its properties are thoroughly described. Other raw materials and methods of rendering them more plastic also receive attention.

* *

Synthetic Resins and their Plastics.

Carleton Ellis. 514 pages, illustrated. $8.00.

The book will serve as a guide and prove a stimulus to the numerous investigators and practitioners in the field of artificial resins. The section on plastic molding is an especially valuable feature.

* *

Pyroxylin Enamels and Lacquers.

Samuel P. Wilson. 213 pages. Illustrated. $3.00

An authoritative work dealing with the materials and manufacture of pyroxylin solutions and with their application in the industry.

Write Book Dept. PLASTICS, 471 4th Ave., N. Y.

in colour is treated with a solution of sodium monochloracetate prepared as follows:—60-100 parts of monochloracetic acid are dissolved in 480-800 parts of water and neutralized with powdered sodium bicardonate. As soon as the solution of the sodium monochloracetate has been incorporated with the viscose, the mixture is stirred for a short time, and then allowed to stand at room temperature. After 6-48 hours the liquid mixture is treated whilst stirring with sulphuric acid of 1-3 per cent strength until it shows a strong acid reaction to congo, whereupon the product separates in the form of flocks or shreds. The precipitate is separated from the mother liquor by decantation, straining through cloth, filtration, centrifuging or the like, and washed with water until it is free from sulphuric acid. More especially during prolonged washing, it shows a tendency to swell and consequently to clog the pores of the filter cloth or paper. It may conveniently be washed by decantation or by centrifuging, or it may be washed by means of a constant flow of water in a vessel having one or more lateral sieves through which the water flows away. After several hours the washing is generally complete, and the product when freshly prepared is soluble in warm water. On evaporation of the aqueous solution there remains a transparent, shining, flexible skin, insoluble in water. The product is now (advantageously in thin layers) dried at atmospheric or reduced pressure, in some cases after centrifuging, or gently pressing, or it may be freed from water by one or more treatments with alcohol, being freed from alcohol, if desired, with ether, and dried.

SOLUBLE IN AMMONIA

The product, cellulose xanthacetic acid (cellulose-thionthiol-carbonic-glycollic acid), when dried directly, consists usually of scales, laminae, skins or pieces, and when previously freed from water by means of alcohol, as a white, more or less flaky or powdery substance (the latter especially after grinding); it has the following solubilities and properties. It dissolves to a clear solution even in very dilute ammonia solution, for example of 0.01-0.05 per cent strength, which on drying yields shining, transparent skins, insoluble in water. The stability of the ammoniacal solution depends upon the content of the solution in ammonia and cellulose-xanthacetic acid. As the content in ammonia increases, so also does the tendency to gelatinization. Thus a solution prepared with ammonia of 0.5 per cent strength gelatinizes shortly after its preparation. The cellulose-xanthacetic acid also dissolves readily in dilute aqueous solutions of aliphatic and aromatic amines, such as primary, secondary or tertiary amines, aniline, toluidine and the like. It dissolves readily even in an aqueous solution of aniline of 0.25-0.5 per cent strength. The clear, viscous solutions in aqueous aniline leave on drying lustrous, transparent flexible skins or layers insoluble in water. The solutions in aqueous solutions of organic amines also show a tendency to gela-

tinize, especially when the solution of the base is comparatively strong, and this tendency becomes greater as the strength of the solution of the base is increased.

The cellulose-xanthaecetic acid also dissolves in aqueous solutions of quaternary ammonium bases, in aqueous solutions of bodies of the urea series, for example, in a solution of urea of 1-10 per cent strength, in aqueous solutions of bodies of the guanidine series (for example in an aqueous solution of guanidine), and in aqueous solutions of bodies of the pyridine series (for example in an aqueous solution of pyridine). The solutions in aqueous pyridine are stable, and on drying they yield lustrous, transparent, flexible skins or layers.

USE OF QUINONE

The cellulose-xanthacetic acid also dissolves in water containing quinoline, in dilute sodium carbonate solutions (for example of 1 per cent strength) and in aqueous solutions of alkalies (for example a solution of caustic soda solution of 1 per cent strength). The solutions in aqueous alkalies decompose on standing at room temperature. For example a solution of the cellulose-xanthacetic acid of 5 per cent strength in aqueous caustic potash of 10 per cent strength gelatinizes in a period of from several hours to 12 hours. This gelatinization occurs as a result of the decomposition of the cellulose-xanthicetic acid into its cellulose-component, thio-glycollic acid, carbon dioxide and hydrogen sulphide. The thioglycollic acid and the nature of the cellulose components may easily be identified as follows:—After the jelly has been allowed to stand for some time (12-48 hours), it is ground in a mortar, treated with dilute sulphuric acid till it shows an acid reaction, and filtered. The filtrate is shaken with ether, and the ether is distilled. Thioglycollic acid remains, and gives with ferric chloride and ammonia the usual reddish-violet coloration. The jelly which is separated from the mother dried and powdered, if desired after liquor is thoroughly washed and then removing the water by means of alcohol, and washing with ether. The product is insoluble in water, and in caustic soda solution of 5, 8, 10 and 15 per cent strength.

(b) The procedure is as in Example 1 (a) with the modification that the viscose is made distinctly or strongly acid by addition of dilute acetic acid.

The cellulose-xanthacetic acid which is obtained resembles in its properties and solubility that obtained in Example 1 (a).

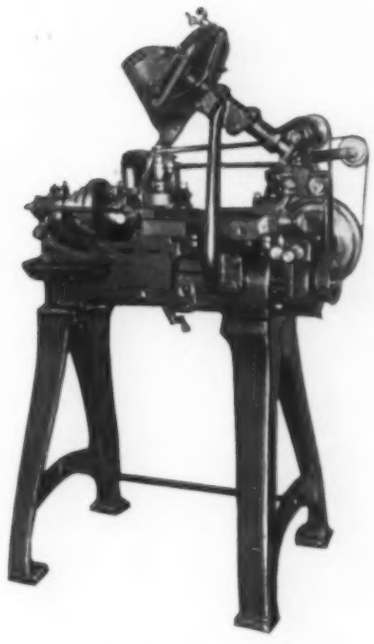
Example 2.

(a) The procedure is as in Example 1 (a), with the difference that the viscose is not neutralized, and that there are used 80-120 parts of monochloracetic acid dissolved in 640-960 parts of water and neutralized with sodium bicarbonate.

The properties and solubilities of the fresh and dried cellulose-xanthacetic acid resemble those of Example 1 (a).

(b) Instead of 80-120 parts of

Our
Sylbe and Pondorf Line



Sylbe and Pondorf Automatic Button Blank Turning Machine especially designed for turning and facing blanks of Plastic material, Mother of Pearl and Horn. The tool is sharpened automatically during operation. Almost no attendance necessary. We invite your inspection of this machine in our showroom.

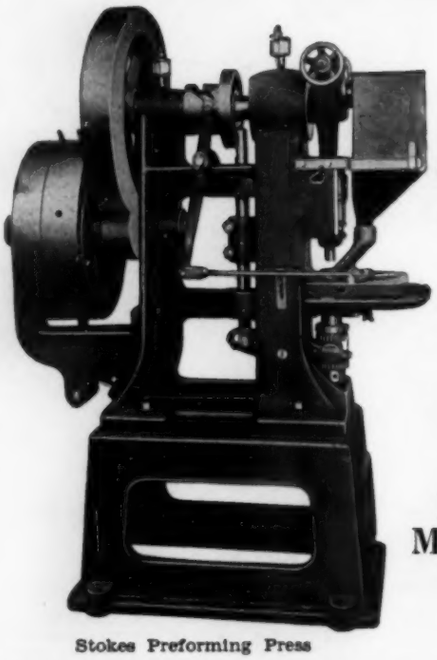
J.J. KREHBIEL
BUTTON MACHINERY
381-4th AVE., NEW YORK, N.Y.
IMPORT EXPORT

KREHBIEL MACHINERY TRADE MARK

FJS FJS

DON'T WEIGH

Durez or Bakelite



Stokes Preforming Press

STOKES
Preforming
Presses
make

40 to 60

preforms per minute

Odd shapes and perforated pieces easily produced.

Weights accurate and easily adjusted

We also manufacture a Measuring Machine which weighs without preforming

F. J. STOKES MACHINE CO.
5834 Tabor Road,
Olney P. O.
Philadelphia

TUMBLING

A NEW TUMBLING METHOD

FOR

ZYLONITE PYROXYLIN
CASEIN BAKELITE
HORN

This Method eliminates buffing cost.

There is no rubbing or tripoli polishing necessary before or after tumbling.

A brilliant and lasting finish is applied to each piece, equal if not superior, to results obtained from present methods of hand polishing.

Your finishing costs can be materially reduced by this revolutionary method of tumbling your parts.

We will gladly tumble samples without cost.

METHODS, EQUIPMENT, FORMULAS

CONSULTING OPERATIVE

Rudolph R. Siebert

449 CUTLER BLDG. ROCHESTER, N. Y.

monochloracetic acid, there are added to the viscose only 60-70 parts dissolved in 480-560 parts of water and neutralized with sodium bicarbonate. The cellulose-xanthacetic acid so obtained differs from that obtained according to Example 2 (a) in that it is practically insoluble in water, or in hot water, when in the freshly prepared condition.

(c) The procedure is as in Example 2 (a) with the modification that for incorporation with the viscose there are used only 40 parts of monochoracetic acid in 320 parts of water, neutralized with sodium bicarbonate. The cellulose-xanthacetic acid obtained is insoluble in water, aqueous ammonia, organic amines and pyridine. It is scarcely soluble in dilute solutions of alkalies, for example in a solution of caustic soda of 2-10 per cent strength.

Example 3.

1000 parts of viscose prepared as in Example 1 (a), and corresponding with 100 parts of cellulose as parent material, are diluted with 8500 parts of water, and treated, whilst stirring, with a solution of 100-120 parts of monochloracetic acid, previously dissolved in 1000-1200 parts of water and neutralized with powdered sodium bicarbonate. After standing for 24 hours the liquid reaction mixture is made strongly acid towards congo by addition of sulphuric acid solution of 3 per cent strength, the cellulose-xanthacetic acid which has separated in long white flakes is separated from the mother liquor in a suitable filtering apparatus, such as a straining cloth, a filter, a filter press, a centrifuge, or the like, and is washed with water until free from sulphuric acid. The product swells during the washing process to a voluminous, transparent jelly, which, however, does not dissolve appreciably in cold water, and can consequently be washed easily on a straining cloth.

FLEXIBLE FILMS

If the jelly as such be warmed with or without addition of water on the water bath, it is converted into a clear solution, which leaves on drying lustrous, transparent, flexible skins or layers which are insoluble in water. The aqueous solution was found to remain unchanged for 4 weeks, after whcih the observation was discontinued. It yields with ferric chloride a white precipitate, with silver nitrate a precipitate which quickly turns brown and is soluble in ammonia, with copper sulphate a white precipitate and with mercuric chloride a white gelatinous precipitate.

The jelly, after washing, is dried in thin layers at atmospheric or reduced pressure, or it may be mixed with alcohol whilst kneading or stirring, treated several times with alcohol and dried, if desired after washing with ether. If the jelly be dried without treatment with alcohol the cellulose-xanthacetic acid is obtained in the form of transparent films or laminae. If the product be freed from water by means of alcohol before drying, it is obtained in the form of a more or less fine powder, or of flakes.

(Continued on page 151)

Cellulose Esters

(*Continued from page 130*)

tank having a quartz window, for about 50 hours. A reduction in viscosity of from one-half to even one-fifteenth has been recorded. Glacial acetic acid may be used in place of the formic acid; and as both of these acids will also dissolve chloroform-soluble cellulose acetate, the process is likewise applicable to that product.

Bromo-aniline

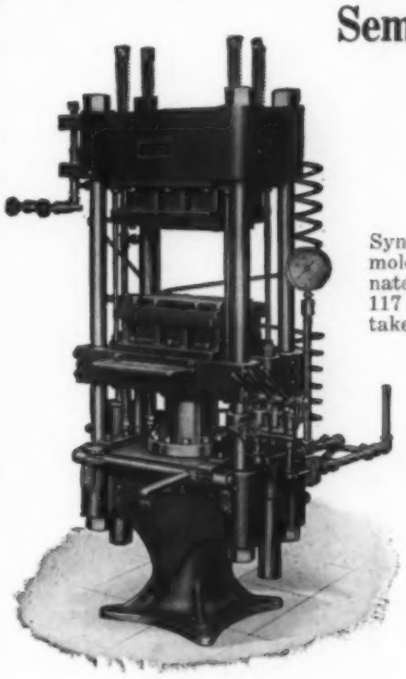
The Kodak Co. also has contributed some novelties in the cellulose acetate field; although aimed mostly at the production of photographic and cinema film. Three patents, U. S. P. 1,641,411; 1,641,412; and 1,641,-413 issued to them on Sept. 6, 1927; on applications of one of their research workers, Mr. Stewart J. Carroll.

These inventions concern themselves with plasticizers that are added to cellulose acetate. The first patent covers the use of alpha bromonaphthalene with acetone-soluble cellulose acetate; a small amount of a bromine-absorbing substance such as dicyandiamine being also added. The second patent covers the use of parabromotoluene and bromobenzenes for a similar purpose; while the last patent describes the use of the bromine substitution products of the aminobenzenes and aminotoluenes, such as 2.4.6-tribromoaniline; 2.4-dibromoaniline; 3.5-dibromo-para-toluidine and 2.4.6-tribromo-meta-toluidine.

A Molding Process

The last patent is that of W. A. Dickie and J. A. Rooney, U. S. P. 1,655,677, and is applicable to all classes of cellulose derivatives and covers a novel process of molding. This will be described in detail in a separate article in the following issue of *Plastics*.

Rejuvenation of Pyroxylin Plastics. See April Issue



Semi-Automatic Molding Press

HOT OR COLD MOLDING

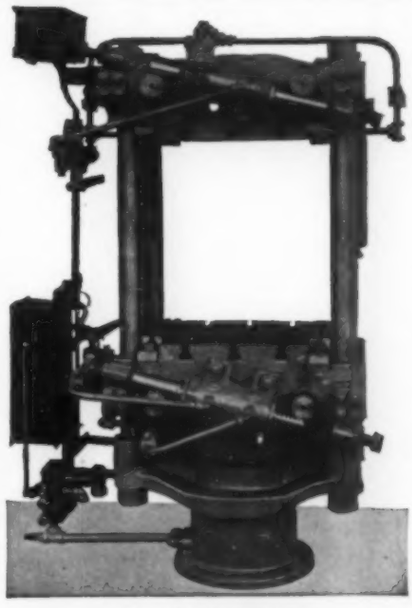
Synthetic Resins and other Plastics, molded in Dies, or in Flat or laminated Sheets. Four sizes, 75, 96, 117 and 168 tons pressure. Will take molds up to 18"x26" for the larger size. Adjustable ejector bars on both head and platen; and quick drop attachment for lower ejectors. Pull-back Cylinders, Copper Coil Steam Fittings, Operating Valves and Pressure Gauge. Also Plain Hot and Chilling Presses, Accumulators, Pumps, etc.

Presses for Special Work made to order.

Our experience of more than fifty years is at your service.

Established 1872.

Dunning & Boschert Press Company, Inc.
No. 330 West Water St. **SYRACUSE, N. Y.**



Semi-Automatic 80 Ton Bakelite Press

Moulding Presses

For all Plastic Materials

This cut shows one of ten presses with adjustable ejectors on both top and moving platens.

The high and low pressure operating valves are manipulated by an automatic electric valve control, without cams or shafting.

We manufacture hydraulic presses for all hot and cold moulding processes and also complete equipment including hydraulic accumulators, pumps, valves and piping.

Write for our pamphlet—
A new Automatic Control for Hydraulic Machinery.

R. D. WOOD & CO.
PHILADELPHIA, PA.
Established 1803 **Works: Florence, N. J.**

Pyroxylin Plastics Scrap

All Grades and Colors

Bought and Sold In Large Quantities

Larry Gering
INCORPORATED
249 Parkhurst St.
Newark,
N. J.

Molded Pyroxylin Plastics

(*Continued from page 135*)

of another color into another cake, and so on giving four mottled cakes each of a respective predominating color. The cakes when finally cooled are cut by a knife into sheets in the usual manner, giving four lots.

Second; the mottled colored sheets 1, desirably about .010 inch thick, are stacked up with sheets 2 of foil, for example tin foil, a single sheet of foil being placed between each two sheets of plastic, to give a stack of alternate sheets of foil and plastic. The foil is preferably about 0.003 inch thick, and the sheets about 54x22 inches or any other convenient dimensions. To give a desirable color effect a sheet of each color may be used in turn in making the stack, as a violet sheet, foil, green sheet, foil, blue sheet, foil, pink sheet, foil, and repeat until all sheets have been used. This is conventionally represented in Figure 2 where 1^v, 1^g, 1^b, and 1^p, indicate violet, green, blue and pink sheets.

The Next Step

Third; from the stack, Figure 2, a section 3, Figure 3, is taken, consisting of, for example, about 36 plastic and 36 foil sheets. (No attempt is made in this figure to indicate individual sheets.) Likewise other similar sections 4, 5, etc., in suitable number are taken from the stack, and are arranged in echelon. The thus stacked sheets are now cut through with any suitable cutting knife K as indicated by the dotted line C, giving a series of subsections, as 3′, 3″, 4′, 4″, 5′, 5″ and so on, of different lengths. In this way there are provided a plurality of subsections of lengths adapting them to be arranged in a molding press as below described.

Fourth; the subsections are desirably given a zig-zag form which, when the sub-sections are placed in the molding press, causes one subsection repeatedly to overlap the next as the corrugations of the subsections are nested. The zig-zagging or crimping may be conveniently done by placing the subsection, as 3′, between two corrugated plates, as somewhat conventionally indicated at P, P, Figure 4, and applying pressure (the sheet being warmed, if necessary) to force the plates toward each other, thus bending or crimping the sheets of the subsection into the desired form.

Fifth; the crimped sub-sections, 3′, 3″ and so on, are placed on a corrugated plate, as A, Figure 5, in a press, indicated in elementary manner at B, jacketed at D for hot or cold water to give temperature changes as desired the subsections being inclined or diagonally arranged in overlapping relation from end to end of the press, substantially as shown. By means of the ram E pressure is applied, while heat is applied by means of hot water in the jacket D, causing the materials to weld, as will be understood, giving a solid block which is firmly attached to the plate A by means of the corrugations. In the welding operation, I find it advisable to use a pressure of about 325 to 375 pounds per square inch during a period of 5 to 7 hours, the maximum temperature of the cake being about 165°—180° F.

Slicing Sheets

Sixth; after cooling, the block 6 (Figure 6) of foil and plastic carried by the plate A is fastened in a horizontal position and sheets 7, Figure 7, of any desired thickness are cut, with any suitable knife, horizontally from the top of the block 6. The sheets thus produced show the variegated color and irregular lines characteristic of the desired artificial pearl. The sheets are now suitably dried to remove most of the volatile sol-

vent, as denatured alcohol (as freshly made they may contain perhaps 8 to 15% volatile solvent) and, if called for, are straightened and polished in the usual way by subjecting to heat and pressure between highly polished metal polishing plates.

Seventh; to increase the strength and rigidity of the sheets, as 7, produced as above described they may, before polishing, be permanently covered, on one or both sides, with a transparent sheet 8 of plastic. Conveniently this is done by applying to the face to be covered a suitable solvent cement X (Figure 7), for example amyl acetate or acetone, and applying the covering sheets 8, after which the assembled sheets are pressed firmly together in a press between metal plates until they are thoroughly cemented or welded together. The cemented sheets, giving the combined sheet 9, are dried for a few days to allow some of the solvent of the cement to evaporate, after which the sheet 9 is polished as described above and is then ready for use for articles such as buttons, buckles, toilet articles, and the like.

It will be understood that various of the steps mentioned above can be simplified or omitted, to secure a product of simpler, and yet attractive design, and the method is applicable to plastics of cellulose esters, other than cellulose nitrate, for example cellulose acetate.

We Are Sorry!

That IMP, the Printers' Devil, has played havoc with the February issue, and hence we ask our readers please to note the following corrections:

P. 71. Story by Mr. Prehn, should be "continued on p. 88"

P. 85, "Die Casting Plastics"

This is a CONTINUATION of Mr. Prehn's story from page 88.

Make Your Presses More Efficient

Molding press equipped with FLEXO JOINTS

The efficiency of your presses can be greatly increased and the cost of maintaining them cut to a small fraction of the usual figure—when you apply

FLEXO Joints

(Patented)

Proper molding is a vital factor in the manufacture of articles from plastic compounds. Behind reliable press performance must stand dependable steam line piping.

FLEXO JOINTS will not clog, break, burst nor leak, insuring a full flow of steam at all times irrespective of the movement of the plates.

Their economy has been clearly proven by leading manufacturers and shows that the first cost of FLEXO JOINTS is quickly repaid by the savings effected.

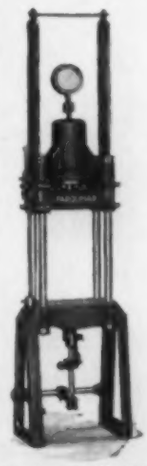
Catalog?

FLEXO SUPPLY COMPANY

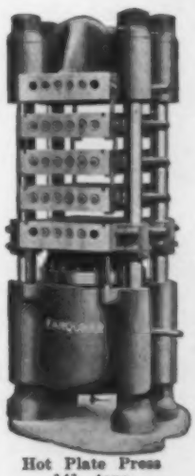
4469 Manchester Ave. ST. LOUIS, MO.

FARQUHAR HYDRAULIC PRESSES

For Every Moulding and Vulcanizing Operation

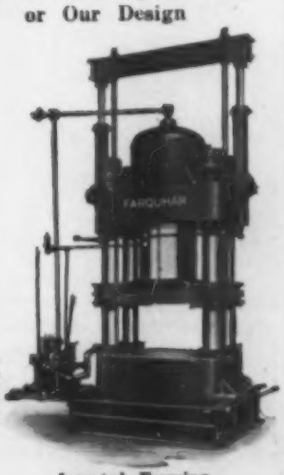


Spring Back Die Press—Sizes 3 to 30 tons.



Hot Plate Press 141 tons.

Built To Your Specifications or Our Design



Inverted Forming Press—1400 tons.

We design and build Hydraulic Presses to specifications furnished us and for the particular requirements in the individual plants. Also special machinery constructed of castings and steel plates, specializing on Jacketed Pressure machinery. We have adequate facilities for making almost any kind of Gray Iron Castings.

Let us quote you on your next Hydraulic Equipment.

A. B. FARQUHAR CO., Limited, Box 177, York, Pa.

No. 3 Drilling Machine

Nothing better for drilling plastic materials, and production work on light metal parts.

Fitted with high grade drill chuck, capacity ¼".

Foot operated, leaving both hands free to handle work.

Drill has two spindle speeds, 1100 and 2800 R. P. M.

Can be used wherever there is an electric light socket. Is equipped with a⅛ H. P. Westinghouse Motor, belted and ready to run.

High in Quality—Low in Price

Standard Tool Co., Leominster, Mass.

MAKERS OF

CELLULOID WORKING MACHINERY
TOOLS, DIES & MOLDS

SOUTHWARK

HYDRAULIC PRESSES

fitted with

STEEL PLATENS

make the best products

600 Ton 5 opening Steam Platen Press with Steel Platens and Hydraulic Elevator

We Have a Press Exactly Suited To Your Work

HYDRAULIC PUMPS
ACCUMULATORS
VALVES, FITTINGS
PIPE, ETC.

ESTABLISHED 1836

SOUTHWARK
FOUNDRY AND MACHINE CO.
400 Washington Avenue, Philadelphia, Pa.

Akron, O.
100 E. South St.

Chicago, Ill.
343 S. Dearborn St.

Rubber Plastics

(*Continued from page 135*)

product. Where the conversion product is to be used in solution, the liquid reaction mixture may in some cases be directly employed, in which case it is desirable to remove residual acid from the reaction mixture by washing or to neutralize the residual acid by treating with an alkali.

Example 2.—It has hereinabove been indicated that the presence of a phenol in the reaction mixture facilitates the conversion reaction. The following procedure is illustrative of this modification of the process: Into 100 parts by weight of a rubber solution, consisting of 5% of rubber dissolved in benzene, add 10 parts by weight of phenol and 6 parts by weight of trichloracetic acid, the ingredients being thoroughly admixed as by stirring. This admixture when heated on a steam bath and the reaction product treated to isolate the solid conversion product in the manner described in the preceding example, yields a tough, thermoplastic material similar to that of the above Example 1. Other phenols than phenol itself may be employed in this process.

The purified conversion products of the above examples are tough, somewhat friable solid materials which are readily heat-plastic at ordinary molding temperatures. Analysis shows them to be chemically less unsaturated than rubber. These products are soluble in the common rubber solvents, such as benzene, gasoline, turpentine, etc., and are practically insoluble in alcohol, ether, acetone, aniline, water, and dilute acids and alkalies.

Progress in the field of Aminoplastics will be discussed in the April Issue.

Cellulose Xanthacetic Acid

(*Continued from page 146*)

The properties and solubilities of the dried body correspond with those of the cellulose-xanthacetic acid obtained in Example 1 (a).

Example 4.

1000 parts of viscose prepared as in Example 1 (a), and corresponding with 100 parts of cellulose as parent materials are diluted, with 2000 parts of water and are treated whilst stirring, after having been neutralized or not, with 60-65 parts of monochloracetic acid, which have been dissolved in 100-130 parts of water and neutralized with powdered sodium bicarbonate. After standing for 24 hours the mixture is diluted with 5000 parts of water, and the cellulose-xanthacetic acid precipitated by addition of sulphuric acid of 1-3 per cent strength until the reaction is strongly acid. The remainder of the process is as in the previous examples. The dry, cellulose-xanthacetic acid possesses the following solubbilities:—

The cellulose-xanthacetic acid obtained when the viscose is neutralized dissolves when freshly prepared in water, in aqueous ammonia, aqueous aniline and the other bases which have been mentioned.

Example 5.

(a) 1000 parts of viscose prepared as in Example 1 (a), corresponding with 100 parts of cellulose as parent material are diluted with 5000 parts of water, and treated, after having been neutralized or not, with 120-150 parts of a-bromopropionic acid which have been dissolved in 1000-2000 parts of water and neutralized with sodium bicarbonate.

The reaction mixture is worked up as in Example 1 (a).

The a-cellulose-xantho-propionic acid obtained resembles in its properties the cellulose-xanthacetic acid obtained in Example 1 (a). As would b cexpected, it gives on decomposition thio-lactic acid.

(b) The procedure is as in Example 5 (a) with the exception that 160-200 parts of a-bromobutyric acid are used instead of the a-bromopropinic acid.

The a-cellulose-xantho-butyric acid corresponds in its properties and solubilities with the cellulose-xanthacetic acid obtained in Example 1 (a). On decomposing it yields thio-a-hydroxybutyric acid.

Example 6.

1000 parts of a viscose (differing from that used in Example 1 (a) only in that there has been added to the solution of the product of the reaction between carbon-bisulphide and sodium cellulose, instead of water, a solution of caustic soda of 7 per cent strength) are diluted with 6000 parts of water and treated, whilst stirring with a solution of 130-135 parts of chloracetic acid in 135 parts of water. After 12-24 hours the mixture is mixed with alcohol of 96 per cent strength, whilst stirring, the precipitate is thoroughly washed with alcohol of 60-70 per cent strength, and is then dried,

PEARL ESSENCE

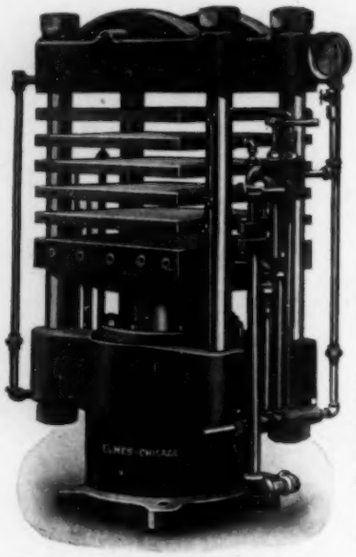
Super Quality Pigment
in
Paste
Lacquer
or
Solvents

Our Chemical Department Specializes in Creating
The Finest Essence

STANDARDIZED

Samples forwarded on request.
Or
Send your Articles to us and our Chemical Dept. will produce the required finish and formulae for you.

Jos. H. Meyer Bros.
Manufacturers of Richelieu Pearls
220 Twenty-fifth St., Brooklyn, N. Y.
Display Offices
389 5th Ave., New York—804 Walnut St., Phila., Pa.



Heat or Chill Quickly

This press is equipped with rolled steel pressing plates drilled from the solid.

These thin steel plates permit a greater number of accessible openings, eliminating the danger of leaks and are extremely sensitive to heat or cold.

Our dual pressure pump will supply one or more presses without an accumulator, where presses are operated to work alternately. A cutout device on the pump permits the operator to deliver both high and low pressure to the press at will.

We offer these presses with any number of openings and pressures to suit.

No. 2892—With Rolled Steel Plates

A popular pressing unit for

Sheet Mica, Celluloid, Rubber and Veneer

Chas. F. Elmes Engineering Works, 1002 Fulton St., Chicago, U. S. A.

NEW YORK—Room 310, 30 Church St., Phone Cortlandt 4435

NEW YORK EXPORT OFFICE—420 Lexington Ave., Phone Lexington 4270

-HYDRAULIC- PRESSES PUMPS ELMES SINCE 1851

A New Service of Immeasurable Value

We will now buy back scrap Pyroxylin from our customers completing the circle of service from the new sheet to the scrap.

F. W. WIGGINS

LEOMINSTER, MASS.

NIXONOID in SHEETS RODS TUBES

RENITE

The Marvelous Casein Plastic

New England Representative for

NIXON NITRATION WORKS & HUDSON PEARL CO., INC.

PEARL ESSENCE CELLULOSE ACETATE LACQUER COTTON

if desired after washing with ether.

The dry sodium cellulose-xanthacetate dissolves in water to a clear, viscous solution which on drying yields a transparent flexible skin soluble in water.

Example 7.

1000 parts of viscose prepared as in Example 1 (a) are precipitated in known manner by means of a saturated solution of common salt, and the precipitate is well washed with a salt solution of 10 per cent strength, pressed and dissolved in sufficient water to bring the total weight of the solution to 5000 parts. A titration of the purified viscose shows that it contains no caustic soda, and merely 2.2 per cent of sodium carbonate. It contains 1.51 per cent of dried cellulose as determined by precipitation with sulphuric acid, 5000 parts of the purified viscose are treated with a solution of sodium monochloracetate obtained by dissolving 50-70 parts of monochloracetic acid in 500-700 parts of water and neutralizing the solution with sodium bicarbonate, and the mixture is allowed to stand for 24 hours, after which it is treated, whilst stirring, with a solution of sulphuric acid of 3 per cent strength until it is strongly acid towards congo; the precipitate, which has separated, is washed with water until it is quite free from sulphuric acid. During the washing it swells considerably in the water without appreciably dissolving. The remainder of the process is the same as in the previous examples. The properties and solubilities of the xanthacetic acid which is obtained correspond with those of the product of Example 3.

In all the foregoing examples there may be used viscose preparations which differ from that used in Example 1 (a) in respect of the grade of sodium-cellulose and proportion of carbon bisulphide. For example the amount of sodium-cellulose may be reduced to only 200 parts, and treated with only 20-25 parts of carbon-bisulphide. The expression "monohalgen derivative of a fatty acid" or "halogen fatty acid" in general and in combination with a specified acid (e. g. monochloracetic acid or chloracetic acid) in the description and claims, is intended to include the monohalogen derivatives of fatty acids and the salts of these derivatives and the derivatives, for example esters of these derivatives, wherever the context permits.

The expression "cellulose-xanthofatty acid" in the description and claims includes the free acids and their salts, particularly the salts with alkali metals, and means:—the compounds which are derived from a fatty acid by substituting for a hydrogen atom united to a carbon atom the residue of a cellulose-xanthic acid in which the cellulose component of the cellulose-xanthic acid may be either cellulose itself or a conversion product of cellulose or a cellulose compound, that is to say as far as the present invention is concerned, those products which are obtained by acting on a cellulose-xanthic acid or a cellulose-xanthate (viscose) with a

Accessories
For Toilet Articles

TASSI BROS. MIRRORS NEW YORK AND PARIS

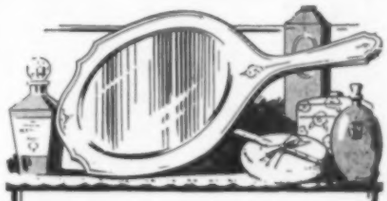
Mirrors of the Better Kind for Fabricators of Celluloid Toiletware

We Specialize in French Mirror Plates

Tassi Bros.

525-531 W. 24th St.

New York City



Good Mirrors will guarantee approval of your Product

Standard Mirror Co

151 - 157 HARRISON STREET

Buffalo

BAKELITE MOULDS DESIGNED — Information on production Moulding, methods and equipment, furnished. Address inquiries to Box No. 50, "Plastics".

EXECUTIVE—Wishes position as Assistant to Sales Manager or General Manager in the moulding industry, 15 years experience Cost Accountant, Production Manager, Purchasing Agent in the electrical industry, the last five years as assistant to the President of a large Bakelite moulding company. Graduate of Accounting, Banking and two years in Engineering. Age 35. Married. Address PLASTICS, Box 51.

FOR SALE—30 Hydraulic moulding presses; Lot of steam tables and separators; 1 Accumulator outfit, all in good working condition. Box 58, PLASTICS, 471 4th Ave., N. Y. C.

WANTED—To buy a molding plant in the vicinity of New York. Equipment and plant should be ready to use. Box 52.

Hambury, 9th February, 1928.
Editor of the "Plastics"

World Trade in Plastics

(*A Correction*)

We are in receipt of a friendly communication from Mr. Fehdinand Giersiepen relative to our article on page 21 of the January issue. As he holds a responsible position with one of the largest European producers of resinoids and is right on the spot, we believe that parts of his letter will interest our readers. He says.

Editor of "Plastics."
Dear Sir:

I always read your journal with great interest as I have a managing job in one of the most important factories of artificial resins in Europe. I therefore trust you will kindly excuse my taking the liberty to draw your attention to some errors, contained in the January edition page 21 "The World Trade in Plastics."

To begin with the capacity of the Czechoslovak factories of synthetic resin, the quantities mentioned are by far too high and especially the manufacturers of Solith, Regal & Co.

When speaking of the importation of plastics into Czechoslovakia, it is incorrect to name only Juvelith as representative of the numerous synthetic resins which are imported as

mono-halogen derivative of a fatty acid, or with a salt of such derivative, irrespective of whether the cellulose component of the cellulose-xanthic acid is cellulose, or a conversion product or a compound thereof. There are 29 claims of which the following are typical.

A process for the manufacture of new cellulose compounds, which comprises acting on a cellulose-xanthic acid with a monohalogen derivative of a fatty acid.

A process for the manufacture of new cellulose compounds, which comprises acting on an alkaline solution of a cellulose-xanthic acid with a mono-halogen derivative of a fatty acid.

A process for the manufacture of new cellulose compounds, which comprises acting on a solution of a cellulose-xanthic acid with a mono-halogen derivative of a fatty acid.

A process for the manufacture of new cellulose compounds, which comprises acting on a cellulose-xanthic acid with mono-chloracetic acid.

A process for the manufacture of halogen derivative of a fatty acid and isolating the product from the reaction mixture by treating it with an agent adapted to neutralize alkali.

As a new product, cellulose-xantho-fatty acid.

others are at least as important as Juvelith. The latter may succeed in competition in Austria, but not in Germany, where Herolith, Dekorit and others must be taken into consideration. They share at least equally in the export trade to Czechoslovakia.

The author further declares Juvelith to be of German origin, while it really is manufactured in Austria, in the factory of Dr. Pollak.

Alkalit, Galalith and Erinoid are well known as casein plastics, and therefore separate from Juvelith owing to their absolutely different nature. I need not explain, I believe, that Galalith is by far the most important of the three above mentioned casein products.

I will confine myself by mentioning some German factories of synthetic resins in the succession of their importance:

Herold A. G., Hamburg, Dr. F. Raschig, Ludwigshafen, of perhaps equal importance; Deutsche Kunstharzfabik G. m. b. H., Berlin; Deutsche Rohstoff-Industrie G. m. b. H., Augsburg; Dr. Heinrich Traun & Söhne, Hamburg; August Riedinger A. G., Augsburg.

OUT NOW

THE SECOND ANNUAL EDITION

PLASTICS

and MOLDED PRODUCTS

Directory, Index and Buyer's Guide

1928 EDITION

You cannot afford to be without the most complete compilation of information on the plastics industry ever published.

PRICE $5.00

Plastics and Molded Products

471 4th Avenue **New York City**

MOLDED PRODUCTS

Devoted to the purchase, further use and merchandising of all manner of molded parts

Vol. 2 MARCH, 1928 No. 3

New Fabric Base Material

High mechanical strength and shock resistance are outstanding features of this material

There has long been a demand for phenol resinoid molding material which, in addition to the usual variety of useful properties, would offer a higher degree of mechanical strength, particularly shock resistance. A material possessing this factor of added strength has been needed especially in the making of molded parts which are subjected to rough usage. This severe service is encountered when the molded parts are installed on the moving or vibrating elements of heavy machinery, or when they serve as the handles for tools or utensils which are apt to be dropped or thrown about in use.

To meet these service conditions, Bakelite Corporation has developed a new fabric-base molding material known as XM-199. In many ways the new material is comparable to the usual powdered molding product in which the phenol resinoid is reinforced with wood flour. Specific gravity is not notably different, but resistance to fracture through shock is many times greater in the new material. Under test, it does not shatter like the standard wood flour product. It is much tough-

Parts shown are all subjected to rough usage. This new molding material is particularly well adapted to this class of work.

er. Even after the surface has been fractured, the body of the material is not broken along a line of regular cleavage, but tends rather to "mush down," as is characteristic of dense fibrous substances.

The new product is made from fabric which has been cut into small pieces, and impregnated with Bakelite resinoid: it is molded in steel dies on hydraulic presses. In the illustration, are shown a number of applications to which the fabric-base material is especially adapted. In molded products such as the fishing shown a number of applications companying illustration, the usual type of phenol resinoid molding material has long been used. The new material, however, yields a much stronger reel frame.

For such implements as the mason's trowel, the machete, and the saw, a material is now available to provide handles which will not break even when dropped or thrown upon a hard surface, stone flooring, etc. The multi-vaned pump rotor (also shown in the illustration) could be made from standard molding powder, but the mechanical strength, even though adequate, would not allow a high factor of safety. By using fabric-base material, both product strength and production economy are secured. To take another example a large electric switch handle could be turned from the well known Laminated stock, and then drilled at one end to take the metal shank. Through the use of fabric-base material twelve or more such units can be produced in a single operation, and a product of adequate durability secured.

The new molding material comes in the form of rough flakes, and does not present the uniform appearance characteristic of the more usual type of resinoid molding powder material. It is not adapted to preforming by the use of tabletting machines, but can be successfully blanked out in closed molds when subjected to a pressure of 8,000 pounds per square inch. In molding it flows freely, and can be made to cut off with a thin fin. In general, the fabric-base material will probably not be found as free-flowing, and versatile for parts of small or intricate design, as is the usual molding powder. Its special property of shock resistance however, extends a new field beyond that which the other materials could satisfy. It has been designed particularly for this purpose, and is seemingly the best achievement to date in a shock resistant product, which can be recommended for tool handles, coil spools, carrying cases, instrument housings, etc.

Molding Possibilities of Cellulose Acetate

Short resume of this industry from its inception down to the present

By Carl Marx

THE history of cellulose acetate goes back just a little farther than that of the first successful pyroxylin plastics. Paul Schuetzenberger, in 1865, first prepared acetylated cotton. It will be remembered that only four years later, 1869, John W. Hyatt, in America, invented the first pyroxylin plastic Celluloid.

While the career of the pyroxylin plastics began soon after their discovery, it required over forty years of effort on the part of research workers in many parts of the globe until a really useful plastic made from cellulose acetate could be produced. The earlier cellulose acetate plastics all suffered from the defect that they were too brittle. A further handicap in the development was the dearth of cheap and efficient solvents for the acetate. Many of the plasticizers that had given excellent results with the pyroxylin plastics were found to be practically worthless when used with cellulose acetate.

The first fairly successful cellulose acetate was produced by George W. Miles, of Boston, Mass., who found a way of rendering the product soluble in acetone by hydrating the cellulose acetate. His process was taken over to Germany and in somewhat improved form became the foundation for the material known as "Cellon" or "Cellone" in Germany. Arthur Eichengruen had an important part in the development of this plastic in Germany.

War Development

Cellulose acetate came into its own during the European War when the commercial manufacture of cellulose acetate dopes for use on airplane wings and fuselages began to engage the chemists on both sides of the conflict.

The highest development was reached in France, Switzerland and England as the result of the work of the brothers Henry and Camille Dreyfus, who were instrumental in founding the British Cellulose & Chemical Mfg Co. With works in France and at Spondon, England, this firm

(*Continued on page 171*)

How the Molder May Safeguard the User

Description of tests made by one molder in an effort to keep their product up to standard

TRUCK # 7 OVEN # 12 HR. BAKE 24 HR. REBAKE 2 - 1 1928

Pan #	Part #	Hardness		Olsen lbs.		Impact Inch Pounds		Remarks
1	369	70	72	1082	1005			
2		65	74	1094	1046			
3		80	79	1427	1450			
4		71	76	1305	1201			
5		73	78	1463	1471			
6		80	82	1476	1524			
7		67	69	1078	1102			
8		66	71	1002	1018			
9		68	67	1040	1150			
10		72	73	1020	1065			
11		81	79	1162	1143			
12	329	63	70	1177	1318			
13		75	78	1332	1101			
14		62	68	1111	1049			
15		65	64	1077	1098			
16		71	74	1249	1221			
17		73	76	1303	1189			
18		68	65	1050	1030			
19		71	69	1302	1369			
20		81	78	1017	1040			
21	501	68	67	1080	1132			
22		72	71	1007	1050			
23		68	68	1026	1007			
24		81	83	1090	1104			
25		79	78	1222	1262			
26		81	64	1138	1005			
27		76	74	1171	1194			
28		63	66	1107	1202			
29		71	74	1095	1112			
30		80	69	1110	1058			
31	709	60	63	1189	1204			
32		85	78	1057	1084			
33		79	72	1303	1057			
34		65	73	1055	1092			
35		68	80	1150	1097			
36		84	79	1227	1106			
37		74	70	1069	1123			
38		66	64	1011	1041			
39		79	81	1065	1146			
40		77	62	1067	1137			
41		64	68	1080	1132			
42	68-1					27½	22 ½	
43						33	27½	
44						22½	27½	AR OCA 2-2-28
45						27½	33	
46						33	22½	
47						22½	27½	
48						27½	27½	
49						33	27½	
50						22½	22½	
51						27½	22½	
52						33½	22½	

FORM OF CHART USED TO RECORD TEST

IN every corporation that has attained any size there has always been one department that has been a big factor in the success of the enterprise. That department is the testing laboratory in which the final product of the concern is tested out to make absolutely certain that it is up to standard. While it is true the Sales manager at times with his chin stuck out will assert that his department is the one which keeps the concern "out in front", at the same time he realizes that if his test department falls down on him he will very shortly show a falling off in sales.

Testing Pieces

We will try to outline shortly in this article the steps taken by one molder to insure a uniform product.

Baking is carried out in pans suitably arranged in a large truck. As soon as the truck and contents are sufficiently cool to permit handling, two or more pieces are withdrawn from each pan and are marked with a number for identification. These are ground off on a sand belt to obtain a smooth bearing surface when inserted in the testing machines.

Crushing Test

Crushing strength is determined by means of an Olsen Machine, the piece being placed between the holding jigs and pressure applied uniformly until fracture of the specimen occurs. Samples are tested for hardness with a Rockwell hardness tester. Pieces subjected to impact when in service are broken in an impact testing machine. The test piece is held in place securely and a one pound hammer allowed to drop a distance of one half inch. The operation is repeated, increasing the drop by one half inch increments and adding the total inch pounds of work required to fracture the piece. A sample specimen failing to withstand a test causes the rejection of the entire contents of the pan from which it was taken. Whether the specimen is to be tested for resistance to impact, crushing strength, hardness, or a combination of the above tests, is determined by whichever quality is essential in service.

The results of the tests are entered on a "Test Report", as per illustration. This "Report" is submitted to the laboratory for approval before the material can be released from the factory.

(*Continued to page 159*)

New Camera All Molded

Color, durability and light weight are factors which influenced this manufacturer to use phenol resinoid materials for most of his parts

By J. A. Maguire

It is interesting to know that not only is molded material being used for this camera's case but that it has displaced most every usual metal part throughout the entire apparatus.

News photograhers are found constantly meeting unusual and dangerous conditions, hazardous not only to themselves but to their cameras which are in some cases worth thousands of dollars. Frequently, instruments are destroyed by accident in the thrilling occupation of getting news pictures for the public.

About seven years ago a North American Photo service photographer using a motion picture camera "shooting" scenes along the waterfront had his camera demolished by a swing crane.

In repairing the camera Bakelite laminated material was used to replace the laminated wood in which the instrument was formerly encased. The laminated strips constitute the frame of the machine. It has lasted in this repaired condition and has withstood many shocks equal to the one which first destroyed it.

But now we have something entirely new in the camera field. In the illustration is a camera which is molded entirely of a phenol resinoid product.

One of the reasons given for popularity of this Kamra as it is called is to be found in the beautiful colors in which it is made, and the durability of the molded case which is practically indestructable. Even the two film magazines are of molded material and are absolutely light tight.

In using a moulded material in the case of his instrument the maker not only has the advantage of a range of various colors which add to the sales appeal of his article. But it also makes the instrument very light in weight. The entire Kamra weighs only 40 ounces and takes fifty feet of standard motion picture film, which will give 400 pictures. A fixed focus F.5. Cinevelostigmat lens is used which needs no adjusting. It is impossible to make a double exposure as the film is moved and the shutter snapped by one turn of the crank. Pictures can be taken from moving objects as from a speeding automobile.

This Kamra becomes all the more interesting when it is learned that the selling price is only $27.50.

And so the camera joins the long line of moulded products. In some lines the strength of the material is the main object; in others its light weight, while in some cases it is the color appeal. The various industries are rapidly finding new uses for plastics. What is novel today is commonplace tomorrow.

The illustration while showing the Kamra in detail cannot do justice to the color

The Heart of Every Motor Car

New patent covering the molding of a complete battery box

AS the popularization of the automobile increases, the number of cars produced annually continues to rise, the demand for storage battery is becoming greater. Despite the advent of alternating-current operated radio sets, the use of storage batteries for radio reception has not very greatly diminished, and it is certain that the industry will continue to be very active.

The older type of thin-walled hard-rubber storage battery box with its awkward wooden reinforcing box is about to pass into the limbo of forgotten things. Modern one-piece molded battery boxes have taken their place. Not only are such boxes very much stronger and less liable to accidental breakage, but there is no liability for deterioration as was wont to occur with the old wooden boxes when the inner rubber lining becamed slightly cracked, and let the acid out to soften and destroy the wood.

Many attempts were made during the past ten years to produce a suitable molded box for storage batteries, but it was difficult to find a material that would withstand the comparatively strong sulfuric acid used as an electrolyte in the battery. The great weight of lead plates that has to be supported in the box proved to be a further handicap in the development of a thoroughly reliable molded container.

Many proposals have been made to fabricate the boxes out of resinoids, pyroxylin plastics and the like; and reclaimed rubber has also found considerable favor.

A box made from an asphalt composition is claimed to be superior for the reason that the raw material is cheap and that, hence, it is possible to make the box of generous dimensions without rendering it too expensive. Alan R. Lukens has described such a box, and has assigned his Patent 1,656,072 (Jan. 10, 1928) to the Richardson Co. Lockland, O.

The necessary characteristics of a battery box are tensile strength, transverse strength, good fiber stress factor, resistance to fatigue, acid resistance under electrical charge and discharge, resistance to the stress resulting from the freezing of the electrolyte in a nearly dis-

---

How the Molder May Safeguard the User

(*Continued from page 157*)

Sample specimens are made before beginning production. Some of these are submitted to the customer for approval while others are tested by the laboratory. All shipments that follow must conform to the tests made on these samples.

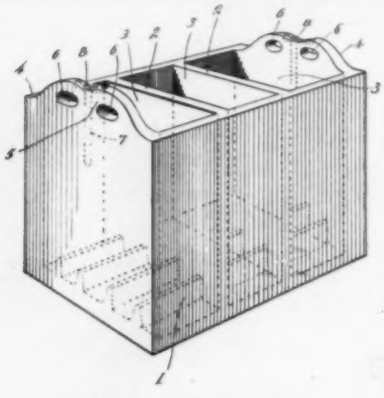
This all enables the molder to have a check on his product that will keep it up to the desired standard at all times.

We are indebted for the material and cuts used in this article to The Connecticutt Molded Products Corp., Meridian Conn.

Showing view of testing laboratory

charged battery, a good low frequency dielectric break-down value, very low moisture absorption, negligible electrical seepage, resistance to shock, and resistance to distortion of shape under stress, pressure, or under the influence of heat resulting from the common practice of overcharging batteries. Also the composition should be readily moldable, and quickly setting, and well responding to great pressures in the mold, which among other things permits the forming of the handle on the box in the mold that forms the box itself.

It will be unnecessary to explain why the above various characteristics are required, if it be remembered that a battery box must contain from fifty pounds and upward of metal



Battery Box in detail

plates, and in motor vehicles must be carried in the frame of the car, and in service of any kind will be subjected to careless usage in the handling of acid and use of high electric charges.

The box has also a structural advantage in the form of a reinforcement at the handle and hold down portions.

The drawing is a perspective of the battery container.

The illustration shows a box having sides 1, a base, and partitions 2 forming cells 3 for use as battery jars. At the ends of the box, there are handles 4, which in the preferred form have a central solid portion 5, with finger holes 6, at the sides thereof.

The handles project above the top surface of the box, and are molded directly integral with the end wall of the box, as distinguished from being molded separately and then united with the box. This is a distinct advantage over any other premolded handle, both in strength of handle and in simplicity of manufacture.

When molding the box, a piece of metal preferably lead coated steel rod, formed in the shape of a T, as indicated at 7, is molded into the end of the box with the top of the T lying at the apex of the handle, and exposed, at least at the central portions, as shown at 8. The hold down fasteners will engage over the exposed metal portion, and the exposed metal is well above the acid line of the box, all other parts of the rod being entirely surrounded by the box material.

With regard to the composition of the box, this is formed of acid resisting asbestos in fibrous form colloidally suspended in a prepared bitumen, preferably asphaltic in nature. Preferably there will be vegetable fibers, such as cotton or felt fibers, also colloidally suspended, said fibers being as long as practical, and in a proportion which will not render the composition susceptible to acid under electrolyte charge and discharge. 15% or more of vegetable fiber cannot be employed.

An asphaltic composition formed largely of gilsonite, or other hard, elastic, and temperature-resistant, bitumen is used. This is mixed with a softer asphalt which develops the adhesive and cementitious characteristics necessary to bind the fibrous material together in a rigid, homogeneous, resilient mass. Around 40% asbestos, 10% cotton fiber and 50% of the asphalt material is suitable.

After forming the collodial mix described, the same is placed while hot into a mold and pressure applied thereto, which may be very great, and the box is thus molded quickly and easily, as this material will set almost at once, under pressure and holding in the mold for any long period is not required.

The resultant box can be formed with ribs for plate spacers, and for retaining the plate packs above the base of the box, and the surface will take a paint very readily.

Plastics and Glass in Happy Union

Latest Development in Safety Glass Field

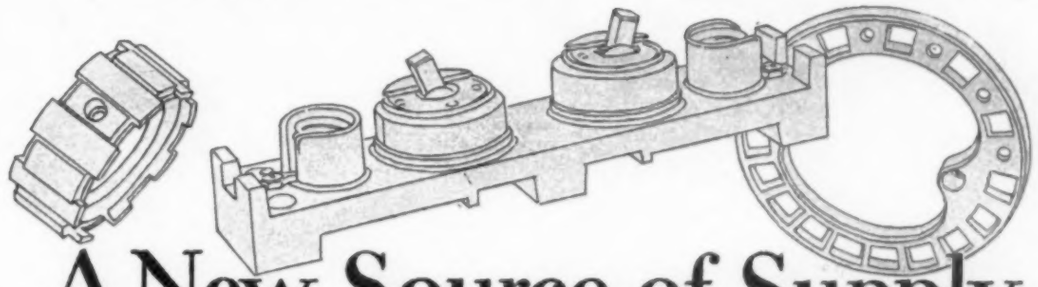
Ever since the late war, non-shatterable glass has been known to have many outstanding advantages, but the great cost of producing it has limited it to such uses as industrial goggles, airplane windshields, bullet-proof windows and the like. The Ford Motor Co. now started the ball arolling when it announced that its new models would be equipped with non-breakable windshields, and it is certain that other motor car producers will be compelled, by popular demand, to follow suit.

News now comes from Pittsburgh, Pa., that the large plate glass concern known as the Pittsburgh Plate Glass Co., has allied itself with the Du Pont Viscoloid Co., the producers of Viscoloid and Pyralin pyroxylin plastics, with the formation of a new company to be known as the Pittsburgh Safety Glass Co., for the manufacture, on a larger scale, of a non-shatterable glass to be marketed under the name of "Du Plate".

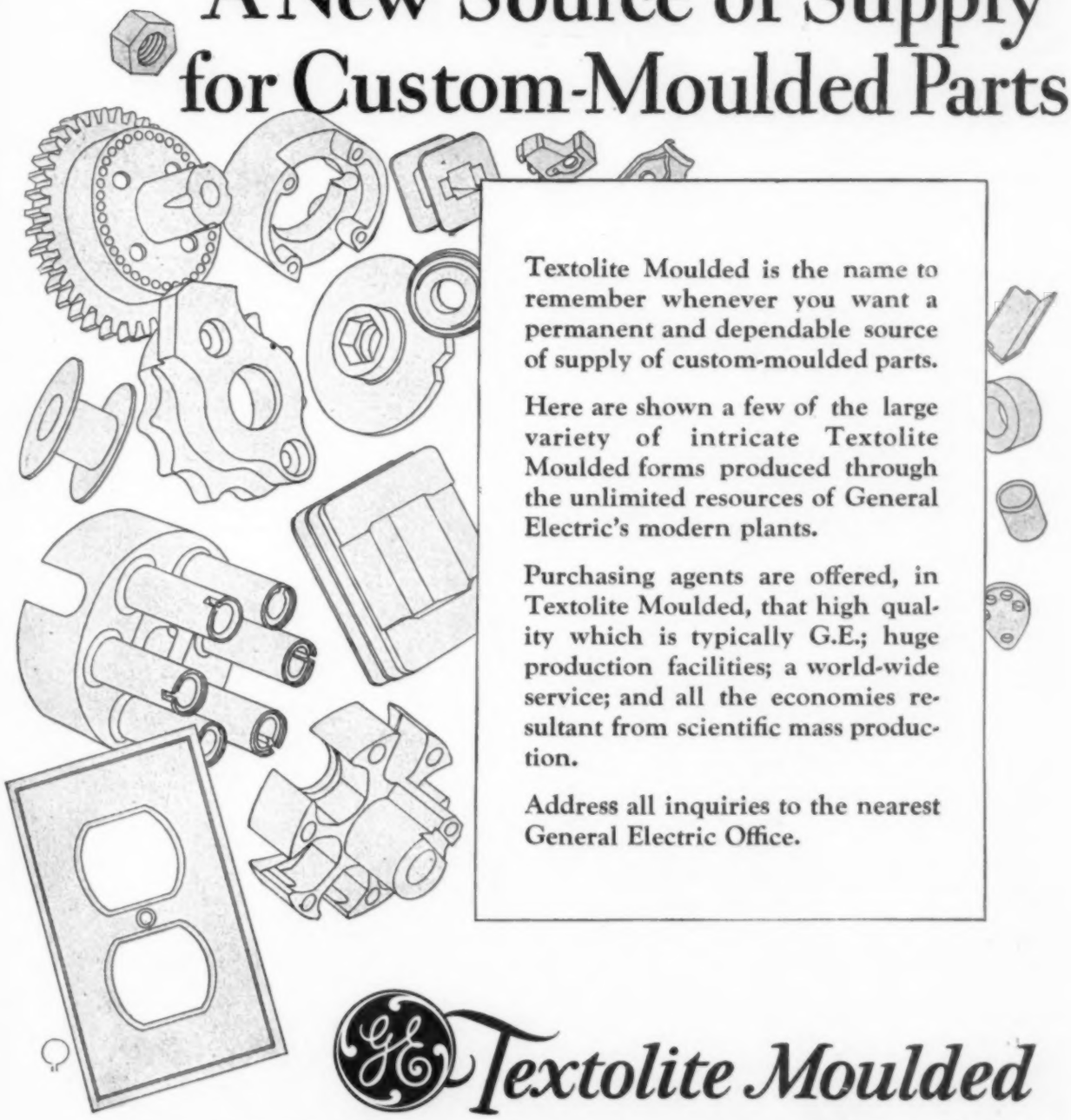
The capitalization of the new company is $1,000,000.00. It is expected that large scale production will begin shortly. The officers of the new company are: B. P. Davis, Jr., of the Du Pont Viscoloid Co., as chairman of the board; H. S. Wherrett, Vice-

(*Continued on page 168*)

G-E TEXTOLITE MOULDED



A New Source of Supply for Custom-Moulded Parts



Textolite Moulded is the name to remember whenever you want a permanent and dependable source of supply of custom-moulded parts.

Here are shown a few of the large variety of intricate Textolite Moulded forms produced through the unlimited resources of General Electric's modern plants.

Purchasing agents are offered, in Textolite Moulded, that high quality which is typically G.E.; huge production facilities; a world-wide service; and all the economies resultant from scientific mass production.

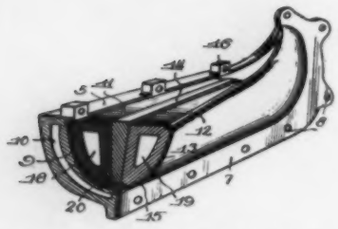
Address all inquiries to the nearest General Electric Office.

GE Textolite Moulded

885-11

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES



Cross section of foot in detail.

Moulded Boats and Canoes

A rather bold idea advanced by an inventor which is not beyond the realm of possibilities

ONLY two months ago we reviewed a method that was bold enough to propose to mold an entire submarine boat; and in July 1926 Plastics, p. 230, described a method for molding airplane pontoons and similar large objects.

It seems quite certain that in the future the molded products produced will not be limited in size. It appears to be merely a question of the size of the presses employed, and the pressure and hydraulic equipment available.

John L. G. Dykes, of Chicago, Ill. proposes to make one-piece molded boats and canoes by the use of a special form of mold. While Mr. Dykes suggests the use of suitable rubber compositions, it should be evident that certain resinoids and similar molding compositions might be employed with practically equally good results. At any rate, the method suggested will undoubtedly be stimulating to the ideas of others, and will give further impetus to the growth in size of molded articles. The lessons learned in the production of such large molded parts will undoubtedly prove useful in furthering development along these lines.

One of the distinct advantages claimed for the molded boats is that they are entirely unaffected by moisture. As even any wooden frame pieces, kiel etc. are covered with the molded material, no deterioration is to be feared.

Mr. Dykes describes his mold and method of making the boats in terms of vulcanized hard rubber. He has patented the molds, (U. S. P. 1,655,496; Jan. 10, 1928) and describes his invention as follows:

Because of the strength of suitable rubber compositions, when vulcanized, the frame, if made of wood in the usual manner, can be formed of much smaller and lighter pieces. Also with my construction, inasmuch as the frame is wholly covered and incorporated in the vulcanite where it is protected from the action of both air and water, it can be made of small pieces of steel or other metal, which has not heretofore been possible because of the deterioration through rusting, which is a characteristic of such metals when subject to the action of moisture and air. The conventional frame structure may, however, be supplied entirely by casting the reenforcements of the rubber composition itself integrally with the skin or body of the boat.

The construction of the mold and its usual arc shown in the figures.

Fig. 1 shows an end of the canoe in a mold, one side of the mold being omitted to more clearly illustrate the details of the assembly; while

Fig. 2 is a top plan of the mold completely assembled.

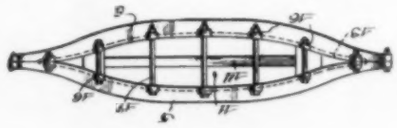
The exterior form of mold preferably comprises two lateral sections 5 and 6 meeting along their centers and bottoms in an enlargement or extension 7, provided with a series of transverse bolt holes 8, by means of which the bottoms and ends of the two sections are secured together.

The interior faces 9 of the molds are of the shape which it is desired to give to the exterior of completed boat and in each section running from adjacent the top to adjacent the meeting lower enlargement or extension 7 is an interior compartment 10 parelling the inner face of the mold into which is introduced the steam or other treating mediums for vulcanizing, tempering and chilling the product. The molds for the interior are also in two pieces, 11 and 12, of generally triangular section.

The outside and bottom surfaces, 13, of these sections, 11 and 12, are given the form which it is desired to impart to the interior of the boat. The sections 11 and 12 are somewhat less in combined width than the completed boat and driven or pressed down between their adjacent faces is a wedge, 14, by means of which the requisite degree of prsesure can be exerted upon the rubber composition, 15, of which the boat is to be formed.

At suitable intervals along the top edges of the sections 5 and 6 are transversely bored blocks or upward embossments, 16, through which pass bolts, 17, for holding the molds securely in position and under pressure during the vulcanizing process.

The interior sections 11 and 12 are also provided with interior cavities 18 and 19 through which are circulated the neces-



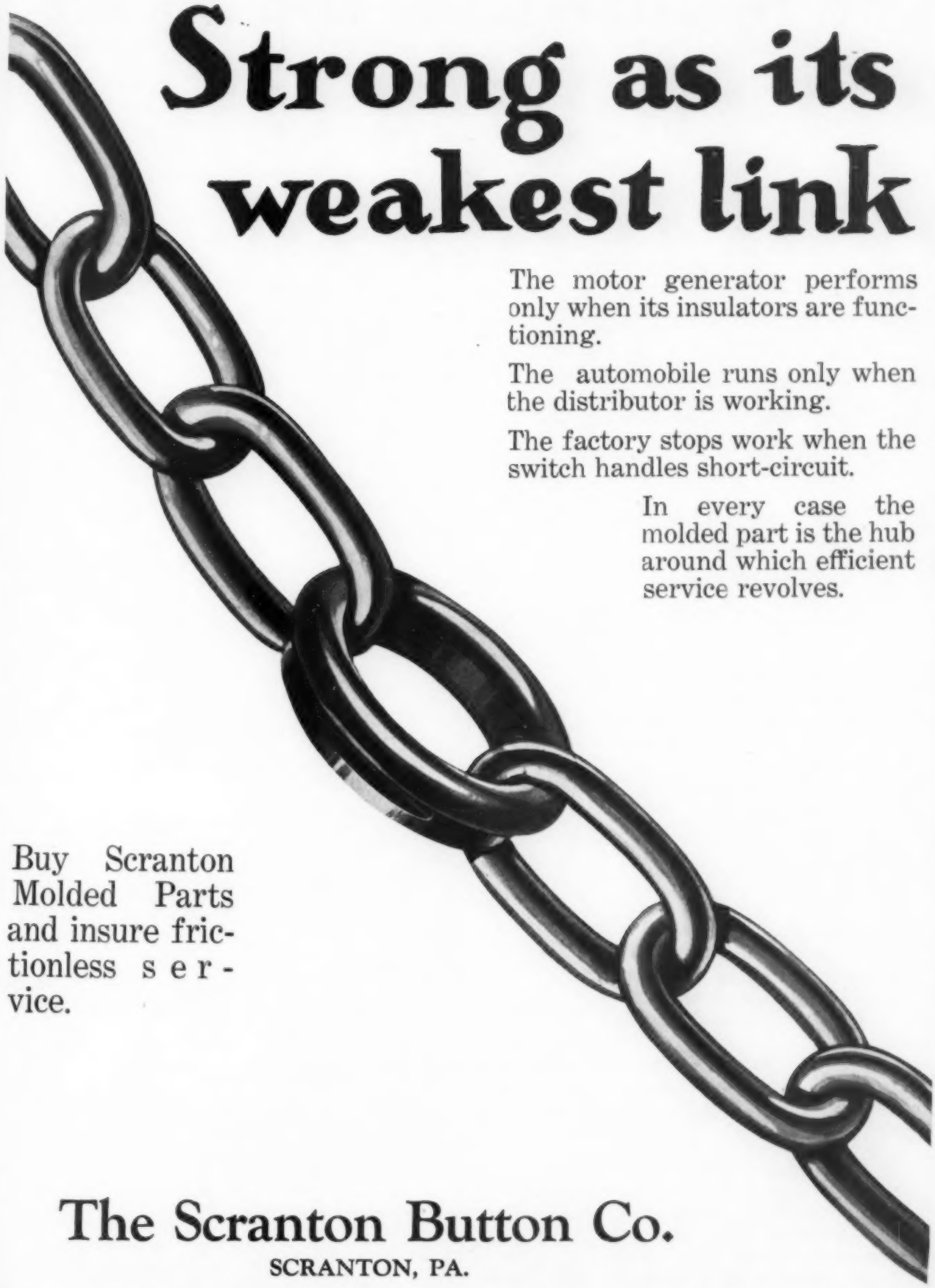
Another View

sary fluids for effecting the vulcanization.

While the materials from which my boats are made are not cheap and the initial expense of molds and equipment are heavy, I, nevertheless, effect such a saving in skilled labor over that necessary in fabricating the present similar structures that I am able to market

(*Continued to page 168*)

Strong as its weakest link



The motor generator performs only when its insulators are functioning.

The automobile runs only when the distributor is working.

The factory stops work when the switch handles short-circuit.

In every case the molded part is the hub around which efficient service revolves.

Buy Scranton Molded Parts and insure frictionless service.

The Scranton Button Co.

SCRANTON, PA.

Western Representative, Gordon D. Wilson
645 Washington Boul., Chicago, Ill.

New York Office, 50 Union Square
Arthur F. Wiseburn, Manager

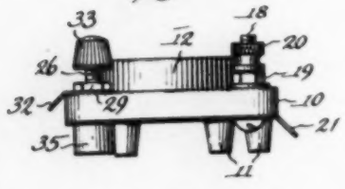
Ohio Representative, J. E. Black & Co.
The 4900 Euclid Bldg., Cleveland, Ohio

More Tube-Bases and Sockets

Resume of some of the recent patents in the radio field

RADIO surely is coming into its own. Whereas a few years ago crystal sets, and perhaps a few one-tube receivers held the stage, the present tendency is toward huge receivers employing from six to fourteen tubes. The new shielded grid

Fig. 1.



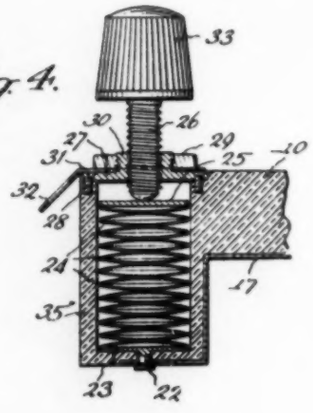
tubes, and the alternating-current operated audions all help to produce a demand for more and more sockets and tube bases.

No matter who the manufacturer of the tube or socket may be, they ALL make them out of molded material. Here indeed is one unending source of demand for molding equipment, resinoids and molding materials. With the advent of the shock-absorbing socket a few years ago, and the employment of multiple sockets, and sockets arranged in gangs, the loss occasioned by the dropping off of the demand for molded dials was offset.

Hundreds of different types of sockets have been described and patented, and yet inventors manage to find new forms and modifications, sufficiently different from those of their predecessors, to obtain patent protection. One of the most recent tube-socket patents concerns a combination socket and pressure reostat, of course all made from one piece of molded material. Harry C. Davis is the inventor, the patent being 1,651,257; Nov. 29, 1927.

The essential feature of the invention lies in the use of one of the supporting feet of the socket as a housing for a compression type of rheostat. The figures are almost self-explanatory, Fig. 1 being a side elevation and Fig. 4 an enlarged sectional detail. The rheostat is of the carbon compression type employing a number of superimposed discs of carbon. The resistance is decreased by applying more pressure to the discs by turning down the screw which is connected to the knob marked 33 on the illustration.

Fig. 4.



Another recent socket patent for audion tubes is that of Alexander Morton, of Glen Ridge, N. J. (U. S. P. 1,649,969; Nov. 22, 1927). This has for one of its objects the provision of means for limiting the distance to which a radio tube can be inserted into the socket, so that the metallic prongs that serve to connect with the pins on the tube itself will not be distorted or broken when the tube is inserted into the socket.

Figure 1 is a plan view of a socket, used in connection with radio sets, for receiving and mounting an audion bulb to which the present invention is applied.

Figure 2 is a vertical sectional view, taken on the line 2—2 of Figure 1.

Figure 3 is a vertical sectional view, taken on the line 3—3 of Figure 2, substantially at right angles to the section shown in Figure 2.

Figure 4 is a detail perspective view on an enlarged scale, of the stop member illustrated in Figure 2.

Figure 5 is a vertical sectional view, through a portion of a socket, similar to Figure 3, showing a slightly different form of stop member.

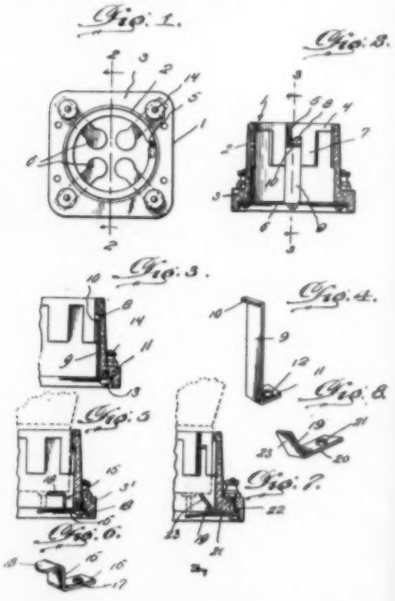


Figure 6 is a detail perspective view on an enlarged scale, of the stop member shown in Figure 5.

(*Continued from page 166*)

Uniform-Mixtures
Service-Unequaled
Experience-Twenty-Five-Years

Satisfied-Customers
Inventive-Resourcefulness
Excellence-Of-Workmanship
Money-Saved
Organization-Efficient-Experienced
Necessary-Modern Equipment

Prices-Right
Adequate-Facilities
Rational-Promises-Made
Tools-Promptly-Correctly Made
So-Give-Us-A-Chance-To-Serve-You

THE SIEMON FAMILY

The Siemon Company, Bridgeport, Conn.
The Watertown Manufacturing Co., Watertown, Conn.
The Specialty Insulating Mfg. Co., Hoosick Falls, N. Y.
The Colasta Company, Hoosick Falls, N. Y.
The American Composition Company, Watertown, Conn.

CENTRAL SCIENTIFIC CO.

PARTS MOULDED of BAKELITE

by SCHNEIDER

The intricacies of the above moulded part, its lustrous finish, and the exact perfection of its details are fair ideas of what to expect when ordering your moulded parts

from

SCHNEIDER ELEC. & MFG. CO.

312 N. Sheldon St.

CHICAGO, ILL.

Trade Moulding Exclusively

More Tube Bases

(*Continued from page 164*)

Figure 7 is a vertical sectional view, through a bulb socket and one of its contact terminals, showing still another form of stop member, secured to the socket by the binding post or wire terminal for one of the spring contacts.

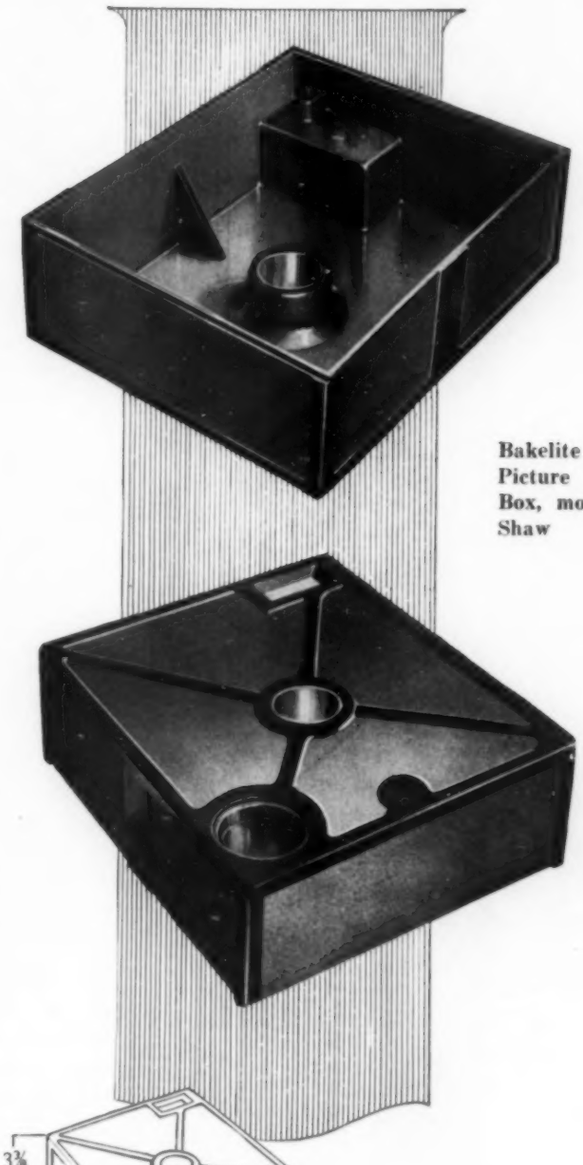
Figure 8 is a detail enlarged perspective view, of the stop member shown in Figure 7.

The socket is indicated generally at 1, and is preferably formed of molded material, preferably a form of suitable insulating material, having the cylindrical portion 2, at one end of which is provided an outwardly extending flange 3, forming the base of the socket, while the opposite end is formed with an inwardly extending flange 4, formed with a pin slot 5. The pin slot is to permit the passage of the reduced positioning pin on the side of the lamp base, in order to position the lamp in a predetermined position in the socket, so that the contact pins thereon will be arranged in predetermined relation with the spring contact 6, mounted on the base flange 3, and extending inwardly in radial relation, in the manner clearly shown in Figure 1.

The cylindrical portion 2 of the bulb socket may be and preferably is formed with longitudinally extending and inwardly directed guide ribs 7, molded in the tubular portions, the inner ends of which terminate with the inner periphery of the flange 4, so that the base of an audion bulb is properly guided into the tubular portion of the socket, the pin projecting from the side of the base of the lamp or bulb entering the slot 5, which is formed in the flange 4, between a pair of adjacent guide ribs 7, as clearly illustrated in Figure 2. It will thus be seen that the guide ribs 7 form a means for limiting the rotative movement of the lamp base, after the same is positioned in the socket, so that the pin may be received in

(*Continued on page 173*)

PLASTIC MOLDING



Bakelite Motion Picture Camera Box, moulded by Shaw

IF YOUR JOB is one that requires expert craftsmanship, if your molded parts must be perfectly made and finished to the highest degree of accuracy, it will pay you to consult Shaw.

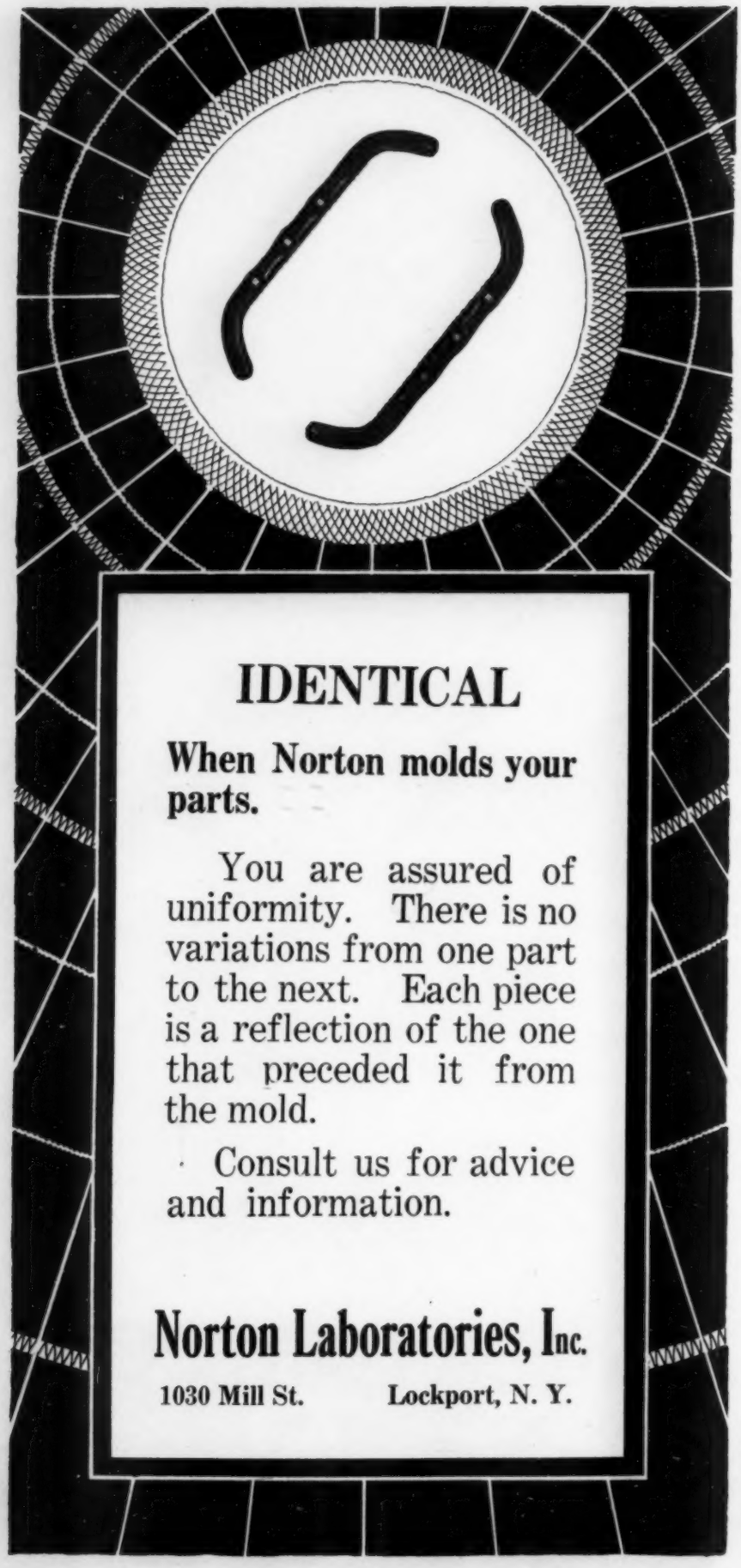
In other words, if your first consideration is to procure quality molding you need a quality molder.

Producers of the finest in moulded parts for thirty-five years.

SHAW INSULATOR CO.

IRVINGTON, NEW JERSEY

Established SHAW 1892


IDENTICAL
When Norton molds your parts.
You are assured of uniformity. There is no variations from one part to the next. Each piece is a reflection of the one that preceded it from the mold.
Consult us for advice and information.
Norton Laboratories, Inc.
1030 Mill St. Lockport, N. Y.

Molded Boats

(*Continued from page 162*)

my product at an attractive figure.

Further the product can be given a number of attractive colors. Also the skin action of glossy vulcanite with water is much preferable to that of any varnished or painted surface.

Plastics and Glass

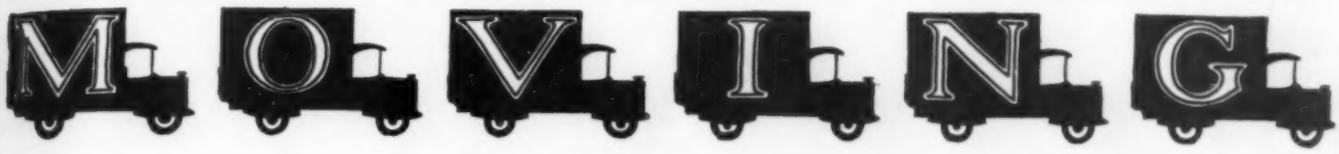
(*Continued from page 160*)

President of the Pittsburgh Plate Glass Co. as president of the new company. As the product is primarily a glass product, sales will be handled through the Pittsburgh Glass Co.

In making the safety glass, two sheets of comparatively thin plate glass are united along their entire surfaces by an interposed piece of plastic material, which in the present case is a sheet of a pyroxylin plastic. It is necessary to cut the glass and the plastic to the exact size required, as otherwise it is impossible afterwards to cut the material. The plastic is moistened with a softening agent, while the glass is first carefully cleaned and coated with a pyroxylin cement. The glass and plastic are then assembled and welded together under very high pressure. The edges are then sealed to prevent ingress of moisture or other agencies that might interfere with the complete and permanent union of the three layers.

For ordinary purposes three layers, i. e. two of glass with pyroxylin in between, are sufficient. For bullet proof glass however, there are five layers, three of glass and two of plastic, the center being glass. Such quintuplex glass will withstand machine gun fire at 15 yards point-blank range without being punctured. This ordinary triplex glass will stand heavy blows and considerable bending without flying to pieces. The great advantage lies in the fact that no fragments are thrown about, and hence the danger of being cut by flying glass is completely removed.

(*Continued to page 170*)



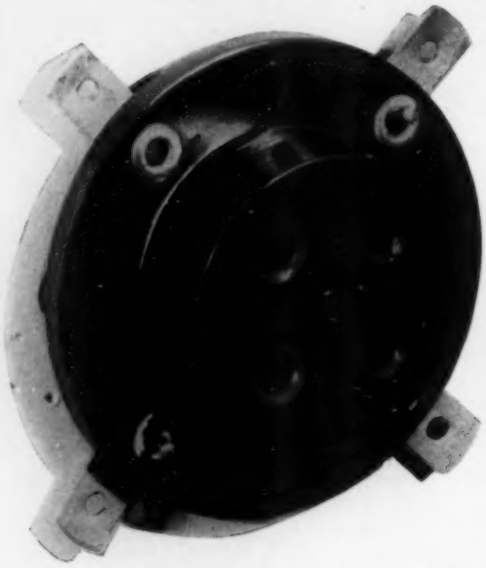
We are in our new home
New York Ave.
and
Herkimer St.
Brooklyn, N. Y.

ELECTROSE

BAKELITE

INSULATE

Insulation Mfg. Co., Inc.
General Insulate Co., Inc.



Radio Tube Socket

A remarkable example of Bakelite molding with metal inserts.

Molds made and production started at very short notice.

SAMPLE AND PRICE ON REQUEST

THE RECTO MANUFACTURING CO.

23 W. Third St. Cincinnati, Ohio

Molders of Bakelite

(Continued from page 168)

Originally triplex glass was made with cellulose acetate, as it was found that pyroxylin would discolor. However, modern research has now provided a pyroxylin that will not change in appearance and the new glass is just as transparent as the plate glass, and will remain so indefinitely.

As the value of the safety glass becomes better recognized, it will without a doubt prove a boon to the pyroxylin and other plastic manufacturers who can furnish a product suitable for the purpose. Many patents have been issued in the past few years, and a list of these makes interesting reading. Practically every conceivable material that is clear and will strongly adhere to glass has been proposed. Among the products actually described and patented are all the known and suggested cellulose esters, such as acetate, formate, butyrate, nitrate; various resins, urea-formaldehyde condensation products.

QUALITY & QUANTITY MOLDERS

of

BAKELITE MAKALOT

and other compounds

15 Years Experience

IN

WE MAKE OUR OWN DIES

Die Designing

Manufacturing

Molding

WE MAKE OUR OWN MOLDS

Johnson Molding & Tool Co.

784 Pleasant St. E. Weymouth, Mass.

Tel. Weymouth 1503

PLASTICS

Is Moving

To

Newer, Larger

Brighter

Quarters

At

114 E. 32nd St.

off Park Ave.

NEW YORK CITY

Molding Possibilities of Cellulose Acetate

(*Continued from page 156*)

produced most of the cellulose acetate used on the allied planes during the war. An American plant was also started near Cumberland, Md., and was the beginning of what recently became the Cellanese Corporation. For a time after the war, the main efforts in the utilization of cellulose acetate were directed toward the production of a Rayon, "Cellanese," which has met with great success.

Within the past year, the Celluloid Company and the Cellanese Corporation have entered into a merger, and under the name of Celluloid Corporation are now producing the first cellulose acetate plastics that have had wide distribution in the United States.

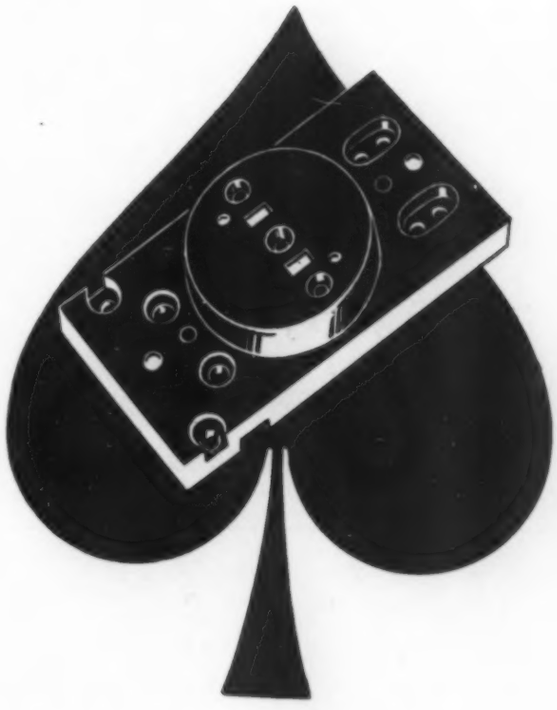
America Trailing

In some respects, America has been trailing behind in the utilization of the cellulose acetate plastics, except perhaps in the moving picture field where the Eastman Kodak Company has contributed some excellent work. In Europe, however, molded products made from cellulose acetate have been used since even before the war.

The discovery of a number of relatively inexpensive but highly efficient plasticizers that will render cellulose acetate suitable for molding in much the same manner as shellac plastics are employed, has opened up an entirely new field for this product. Many parts that are not to be subjected to high temperature in use can be advantageously made from cellulose acetate plastics. The material is now available both in sheets, rods, tubes, as well as in the form of powder for molding operations.

Another method used in forming cellulose acetate articles is a method of extruding the material from a heated die directly into a chilled mold. The ace-

Auburn



Plugs and Sockets
—AUBURN MOLDED—

A positive guaranty of lasting satisfaction and service; a permanent pride in performance and appearance.

A request for information will receive careful and immediate attention.

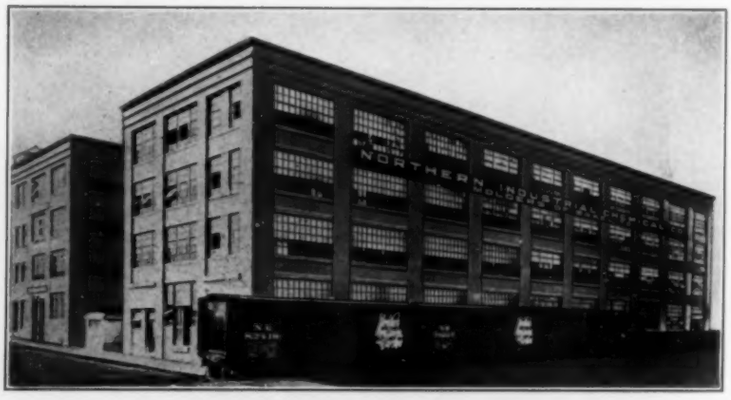
Auburn Button Works, Inc.
AUBURN, N. Y.

MOLDING

BAKELITE
Twenty Years Experience
Moulders since 1908

Service for Every Need

NOVELTIES - MECHANICAL AND ELECTRICAL PARTS

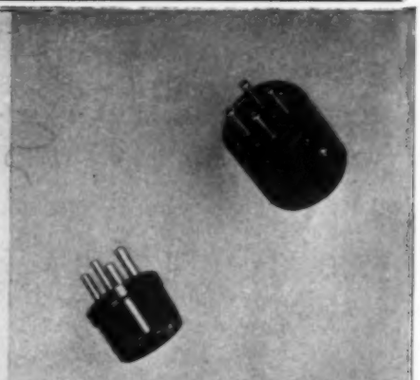


Northern Industrial Chemical Co.
11 Elkins St. Established 1908 Boston, Mass.

TUBE BASES OF EVERY SIZE COLOR AND TYPE

Perfection of the smallest details have made these tube bases the standard of comparison wherever such parts are used.

The same exactness is featured in every part we mold.



MODERN MOLDED PRODUCTS CO. INC
BLOUNT AND ELM STS.
PROVIDENCE, R.I.

tate, at 150° C. flows about like molasses. As it enters the chilled mold there is first formed a thin film of hardened plastic in contact with the interior surface of the mold, reproducing the same with the utmost fidelity. The balance of the material then gradually also chills and in a few minutes the mold can be opened and the finished piece removed. In some respects this method is even superior to molding by means of preformed biscuits or from powder, as the flow of the material during the molding operation gives it very desirable elastic properties.

A further great advantage of the cellulose acetate plastics is their light color, and non-flammability. They can be produced from practically transparent to jet black, and in every conceivable color mottle or other effects, such as pearl, amber and ivory.

The present development in America lies in the hands of the Eastman Kodak Co., and the Cellanese Corporation as the main producers. Users of molded products would do very well to investigate the possibilities of this material, especially where color and esthetic appeal are essential features in the finished product.

New President for Celluloid Corp.

Celluloid Corp. announces the resignation of Mr. Robert Campbell as president effective March 1st, 1928. Mr. Campbell had held this position since July 8th, 1926. His place is being taken by Mr. John A. Stephens, Jr. The present officers of the corporation are John A. Stephens, Jr., President; Chas. F. Reeves, Vice President in charge of sales,; Harry Soper, Vice President in charge of production, and A. E. Cameron, Secretary and Treasurer. While Mr. Campbell's resignation took effect March 1st, he is to continue to give the Corporation the benefit of his judgment and experience.

(*Continued from page 166*)

the seat portion 8 in which it is held by the natural resiliency of the spring contacts 6, at which time the contact pins on the lamp base are in proper contact with the contact springs.

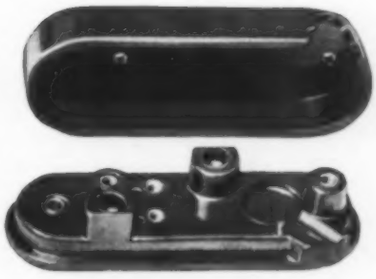
In the provision of a contact of this character, it will be seen that if the lamp base is forced into the socket too great a distance, the contact studs or pins on the ends of the base will force the spring contacts 6 downwardly a sufficient amount to bend these contacts, and as a result, the natural resiliency of the spring contacts 6 will not cause them to engage the ends of the contact pins on the bulb socket, when the positioning pin is seated in the recess 8, so that the circuit with the socket and the bulb therein will not be properly completed.

In order to prevent the insertion of the lamp base too great a distance into the socket, a suitable stop member is indicated at 9, in Figures 1, 2, and 3, which is positioned against the inner periphery of the cylindrical portion 2, and extends between the guide rib 7, adjacent the slot 5, the upper end being formed with a lateral extension 10, projecting inwardly of the tubular portion, which is slightly inclined, as illustrated in Figure 2, to the main portion of the stop member 9, which serves to receive and limit the positioning pin carried on the base of the audion bulb, for limiting the distance the base may be inserted into the socket.

The lower end of this stop member 9 is provided with another lateral extension 11 in opposite directions to the extension 10, which is formed with an opening 12, for receiving a suitable screw member 13, adapted to secure the stop member to the base flange 3, of the socket. This stop member, as shown in Figures 1, 2, and 3, is positioned in the tubular portion, in longitudinal alignment with the slot 5, and is secured to the base flange 3, intermediate the point at which the contact springs 6 are secured thereto by the binding post 14.

MOULDERS OF PLASTICS & BUILDERS OF MOULDS

KUHN & JACOB
MACHINE & TOOL CO.
TRENTON ~ ~ ~ ~ N.J.



An excellent example of perfection in molding by Kuhn & Jacob

BAKELITE
Molded Parts

QUALITY QUANTITY
DEPENDABILITY

Boonton Molding Co.
324 Myrtle Avenue
Boonton, New Jersey

CUSTOM MOLDERS

Advertisers Index

Aladdinite Co. 124
American-British Chem. Sup. 177
American Insulator Co. 174
American Pearl Ess. Corp. 176
Atom Chemical Corp. 176
Auburn Button Wks. 171
Bakelite Corp. 122
C. J. Bates & Co. 176
Becker Moore 176
Boonton Molding 172
The Burnet Co. 177
The Burroughs Co. 126
Celoron Co. 139
Celluloid Corp. 180
The Colasta Co., Inc. 178
T. M. Duche & Sons 177
Dunning & Boschert 147
Du Pont Viscoloid Co. 125
Economy Ticket & Label Co. 176
Elmes Engineering Wks. 152
Erinoid Co. of America 128
A. B. Farquar 149
The Fiberloid Co. 179
Flexo Supply Co. 149
France, Campbell & Darling 176
French Oil Mach. Co. 144
General Electric Co. 161
General Plastics, Inc. 123
Gering, Larry, Inc. 148
F. F. Gilmore 177
Wm. S. Gray & Co. 176
Insulation Mfg. Co. 169
Johnson Molding & Tool Co. 170
Jungmann & Co. 177
Karolith Corp. 121
J. J. Krehbiel 145
Kuhn & Jacob Machine & Tool Co. 172
Evarts G. Loomis 136-7
Jos. H. Meyer & Bros. 151
Modern Molded Products Co. 173
Northern Industrial Chemical Co. 173
Norton Laboratories 168
Henry W. Peabody 177
Heinrich Prehn 176
Recto Mfg. Co. 170
William H. Scheel 177
Schneider Elec. & Mfg. Co. 166
Scranton Button Co. 163
Shaw Insulator Co. 167
Rudolph Siebert 146
The Siemon Co. 165
Southwark Fdry. & Mach. Co. 147
S. S. Spiro 177
Standard Mirror Co. 153
Standard Tool Co. 150
F. J. Stokes Mach. Co. 146
Tassi Bros. 153
Terkelsen Machine Co. 141
Watson-Stillman Co. 143
E. W. Wiggins 152
R. D. Wood & Co. 147

Say you saw it in PLASTICS

MOLDERS OF

Phenolic & Cold Molded Composition

American Insulator Corporation

DANBURY, CONN.

BUYERS' GUIDE

ACCUMULATORS
The Burroughs Co.
John I. Cavagnaro, Harrison, N. J.
The Dunning & Boschert Press Co. Inc.
Chas. F. Elmes Engineering Works
French Oil Machinery Co.
R. D. Wood
A. B. Farquhar

ALADDINITE
Aladdinite Co.

BAKELITE
Bakelite Corporation

BLOOD
Jungmann & Co.

CAMPHOR (Synthetic)
C. B. Peters Co.

CASEIN
Jungmann & Co.
T. M. Duche

CASEIN PLASTICS
Aladdinite Co.
Karolith Corp.
Erinoid Co. of America

CELORON
Celoron Co.

CELLULOID
Celluloid Co.

CELLULOSE ACETATE
Jos. H. Meyer Bros.
American British Chemical Supplies Co.
E. W. Wiggins

COLASTA
Colasta Co., Inc.

COTTON FLOCK
Peckham Mfg. Co.

CUSTOM MOULDERS
American Insulator Co.
Allen & Hills, Auburn, N. Y.
Auburn Button Co., Auburn, N. Y.
Boonton Molding Co., Boonton, N. J.
Connecticut Molded Products Corp., Meriden, Conn.
General Elec. Co.
Insulation Mfg. Co., Brooklyn, N. Y.
Johnson Molding & Tool Co., Weymouth, Mass.
Kuhn & Jacob, Trenton, N. J.
Modern Molded Prod. Co., Providence, R. I.
Northern Indus. Chem. Co., Boston, Mass.
Norton Laboratories, Lockport, N. Y.
Recto Mfg. Co., Cincinnati, Ohio
Schneider Elec. & Mfg. Co., Chicago, Ill.
Scranton Button Co., Scranton, Pa.
Shaw Insulator Co.
Siemon Co.

DIAMONDS—INDUSTRIAL
F. F. Gilmore & Co.

DIES
Standard Tool Co.

DUREZ
General Plastics Inc.

ERINOID
Erinoid Co. of America

FIBERLOID
Fiberloid Corp.

GLASS, SILVERED
Standard Mirror Co.
Tassi Bros.

GUMS
France, Campbell & Darling
Wm. H. Scheel

HYDRAULIC EQUIPMENT
Fred S. Carver, New York City
John I. Cavagnaro, Harrison, N. J.
Evarts G Loomis Co.
Terkelsen Machine Co.
Burroughs Co., The,
Watson-Stillman Co.
Chas. F. Elmes Engineering Works
Southwark Foundry & Mach. Co.
Dunning & Boschert Press Co.
French Oil Mill Machinery Co.
A. B. Farquhar
R. D. Wood Corp.

KAROLITH
Karolith Corp.

LABELS
Economy Ticket & Label Co.

MANICURE ARTICLES
C. J. Bates & Sons, Chester, Conn.

MEASURING MACHINES
F. J. Stokes Mach. Co.

MIRRORS
Standard Mirror Co.
Tassi Bros.

MOLDING POWDERS
Bakelite Corp.
Celoron Co.
Colasta Co., Inc.
General Plastics., Inc.

PEARL COATING
American Pearl Essence Co.
Jos. H. Meyer Bros.
E. W. Wiggins

PHENOL RESINOIDS
Bakelite Corporation
General Plastics Inc.
Colasta Co., Inc.
Celoron Co.

PUMPS—HYDRAULIC
John I. Cavagnaro, Harrison, N. J.
The Dunning & Boschert Press Co. Inc.
Chas. F. Elmes Engineering Works
French Oil Mch. Co.
R. D. Wood Corp.
A. B. Farquhar
Terkelsen Machine Co.

PYROXYLIN PLASTICS
Fiberloid Corp.
Celluloid Corp.
Jos. H. Meyer Bros.
Du Pont Viscoloid Co.
E. W. Wiggins

PYROXYLIN PLASTIC SCRAP
Alfred Harris & Co., Ltd.
Larry Gering

ROLLING MACHINERY
Evarts G. Loomis Co.
Farrell-Birmingham Co., Inc., Ansonia, Conn.

SHELLAC
Wm. H. Scheel
Henry W. Peabody Co.

SWING JOINTS
Burroughs Co., The,
Evarts G. Loomis Co.
French Oil Machinery Co.
Hydraulic Press Mfg. Co.
Flexo Supply Co.

TICKETS
Economy Ticket & Label Co.

TOOLS
Standard Tool Co.

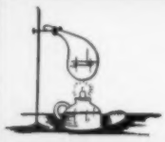
TUMBLING
Rudolph R. Siebert

VARNISHES
Celoron Co.

VISCOLOID
Du Pont Viscoloid Co.

WOOD FLOUR
Acme Oil Co.
Becker Moore Co.
John C. Hoornbeek's Sons Co.
C. B. Peters Co.
S. S. Spiro
Burnett Co.
Jungmann & Co.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in PLASTICS. Please mention PLASTICS when writing to these firms.



Materials
for the Plastic Industries

LARGEST MANUFACTURERS OF

WOOD FLOUR

IN THE WORLD

Inquiries solicited

BECKER MOORE & CO.

NO. TONAWANDA, N. Y.

Cellu-Gummed Labels

That stick to Pyroxylin Plastics.

Also Regular Gummed and Ungummed Labels, printed, plain, embossed, die cut, Cardboard Tags, printed and blank.

Economy Ticket & Label Co.

552 7th Ave., New York City

NEW

PEARL ESSENCE

PASTE & LACQUERS

Our Sunlite Pearl Essence

HIGHEST LUSTRE
READY FOR DELIVERY NOW

QUALITY BEST PRICES LOWEST

Originators of American Pearl Essence Since 1917
Formerly with NEPTUNE CHEM. CORP.

AMERICAN PEARL ESSENCE CORP.

971 Nostrand Ave. BROOKLYN, N. Y. Tel. Slocum 1510, 4171

GUMS

For Moulded Composition

RESIN GUM COMPOUNDS COPAL

FRANCE, CAMPBELL & DARLING

IMPORTERS

133-37 FRONT ST. NEW YORK

Dipping Colors—Cements for Celluloid and Pyroxylin Plastics

Pearl Essence Lacquers

ATOM CHEMICAL CORPORATION

96 E. 10th St., New York City

Tel. Stuyvesant 7184

Manicure Steels

for mounting in handles

Nail Files
Cuticle Knives
Shoe Hooks, Pushers, etc.

Made by

C. J. BATES & SON

CHESTER, CONN.

CASEIN DRIED BLOOD

ARE YOU INTERESTED IN ENTERING THE

PLASTICS FIELD

IF SO, CONSULT ME FOR INSTALLATION, FORMULAE AND METHODS

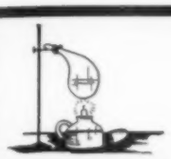
ADDRESS H. P., CARE PLASTICS

ARTIFICIAL HORN SYNTHETIC RESINS

Phenol U. S. P.
Formaldehyde
Denatured Alcohol
Methanol
Whiting

WM.S.GRAY & CO.

342 Madison Ave.
New York City



Materials
for the Plastics Industries

RENNET CASEIN

BLOOD ALBUMEN
Finely Powdered

Special Grades for Making Plastics

JUNGMANN & CO.
Incorporated
5 Desbrosses St., New York

DIAMONDS
FOR
TURNING
PLASTIC
MATERIALS

F. F. GILMORE & CO.
Diamond Tools
198 Dartmouth St. Boston, Mass.

Established 1889

The Burnet Company

John D. Newton

96 Wall Street
New York

Wood Flour
Phenol U. S. P.
Formaldehyde 40°

and other raw materials used in the manufacture of high grade molding compounds.

Inquiries Solicited

Warehouse	Telephone
292 Pearl street	John
New York	0199

GUMS
and
RAW MATERIALS
For Moulders of
Composition Buttons
Electrical Radio &
Record Stock

ASPHALT—Gilsonite and Powdered Asphaltum.
COMPO BLACK—
FILLERS — Aluminum Flake, China Clay, Record Black Filler, Talc, Etc.
GUMS—A most complete line of every description.
MICA—Light and Dark—Various Meshes.
WAXES — Camauba Montan, Stearic Acid, Stearine and Powdered Wax.

Celluloid Polishes
TRIPOLI
White and Black Polishing Compounds

WILLIAM H. SCHEEL
Importer—Manufacturer
Exporter
179 WATER ST., N. Y. C.

CELLULOSE ACETATE

Press Mass Powder

American-British Chemical Supplies, Inc.
15 E. 26th St. New York City

A Special
Shellac
For each requirement

Henry W. Peabody & Co.
17 State St.
New York, N. Y.

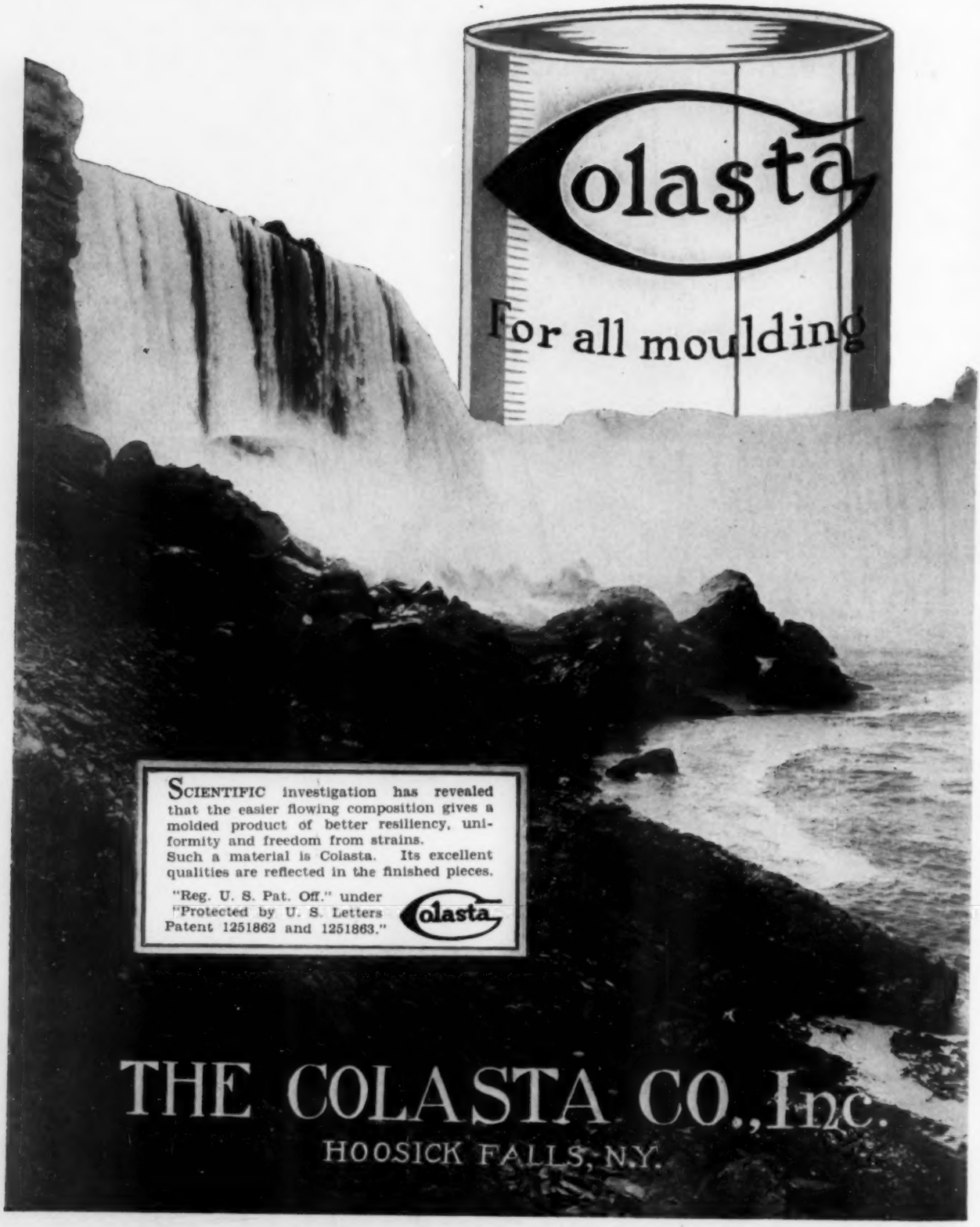
HARDWOOD FLOUR
60-80 & 100 mesh.
Oak, Hickory, Birch
Finest grades of
SOFTWOOD FLOUR
All grades for Compositions.
Send us your Inquiries.

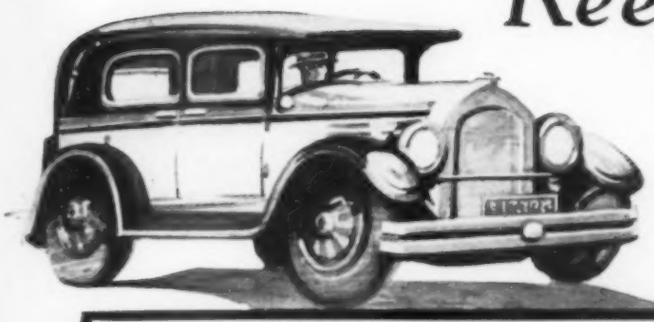
S. S. SPIRO
505 FIFTH AVENUE
NEW YORK, NEW YORK

HAVE YOU ANYTHING
FOR
The Plastics Industry
IF SO,
THIS SPACE IS AVAILABLE
WRITE FOR RATE

CASEIN
ALL TYPES

T. M. DUCHÉ & SONS
376 Greenwich St.
New York City


Colasta
For all moulding
SCIENTIFIC investigation has revealed that the easier flowing composition gives a molded product of better resiliency, uniformity and freedom from strains.
Such a material is Colasta. Its excellent qualities are reflected in the finished pieces.
"Reg. U. S. Pat. Off." under "Protected by U. S. Letters Patent 1251862 and 1251863."
Colasta
THE COLASTA CO., Inc.
HOOSICK FALLS, N.Y.



Keeping Pace with Industry.

MANY an infant industry has found that certain factors of its product were incomplete. The Fiberloid Corp. has stepped in where others have hesitated, and filled the vacant niche. Fiberloid has given utility and beauty to products heretofore lacking these essentials. Keeping pace with the industry and always a step ahead Fiberloid has helped make sales and progress.

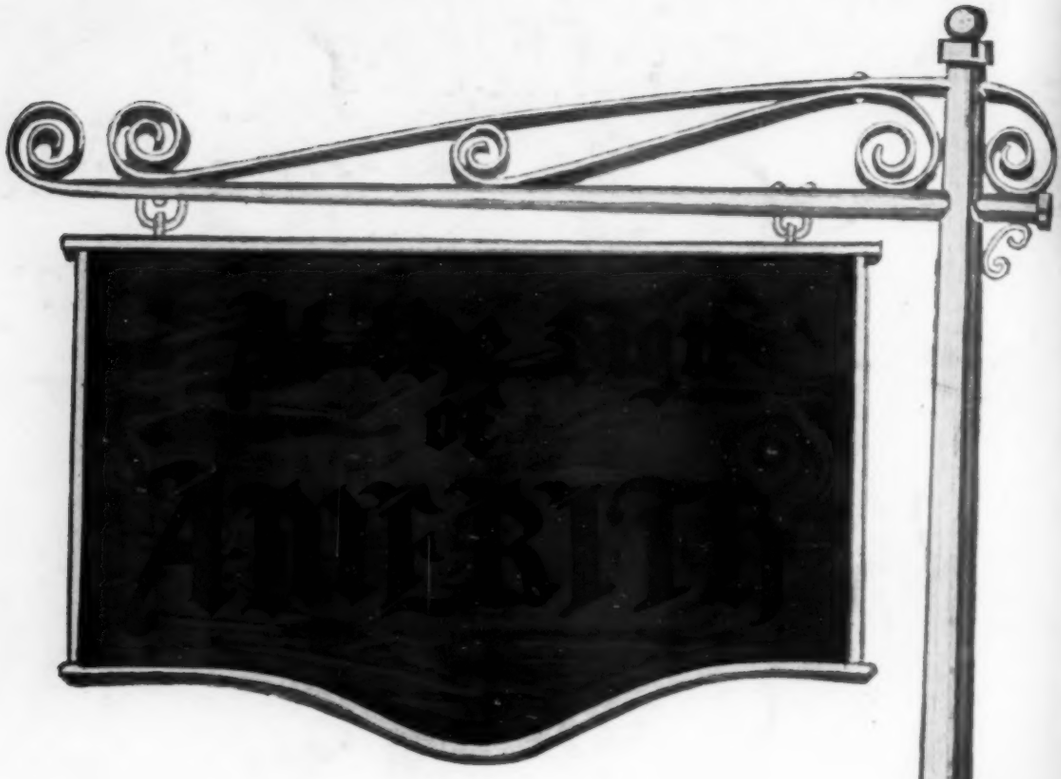
The Fiberloid Corporation

Works & General Offices

Indian Orchard, Massachusetts

New York Office
200 Madison Avenue

Chicago Office
Room 1512 No. American Building



THE name "AMERITH" was coined by Celluloid Corporation and registered as a trade mark in 1925. The name is derived from the word "merit", an inherent quality of all products made by Celluloid Corporation in its 57 years of experience.

"AMERITH" is now universally accepted as standing for the best that is obtainable in pyroxylin plastic material.

In the form of sheets, rods and tubes "AMERITH" is recognized everywhere as "the master plastic".

CELLULOID CORPORATION

290 Ferry Street, Newark, N. J.

Sales Offices: 58 West 40th St., New York City

36 South State St.	**97 Water St.**	**340 Sansome St.**	**188 Morris Ave.**	**52 Chauncy St.**
Chicago	**Leominster**	**San Francisco**	**Providence**	**Boston**